

Read through the entire PACE text; then open your Activity Pac to page A and begin the activities.

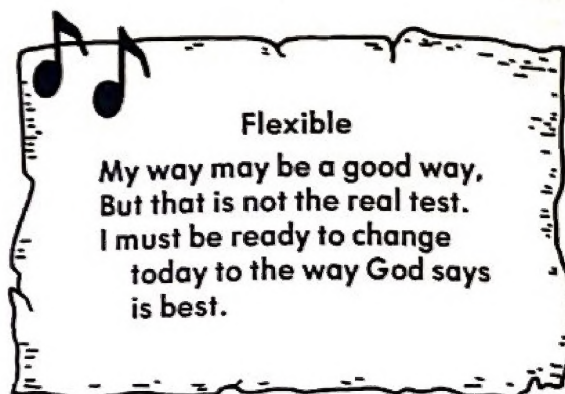
Goals

To learn about:

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To learn to set my desires on Godly things so that I can accept changes made by others—to be flexible

To memorize and say Colossians 3:2

Scripture Verse

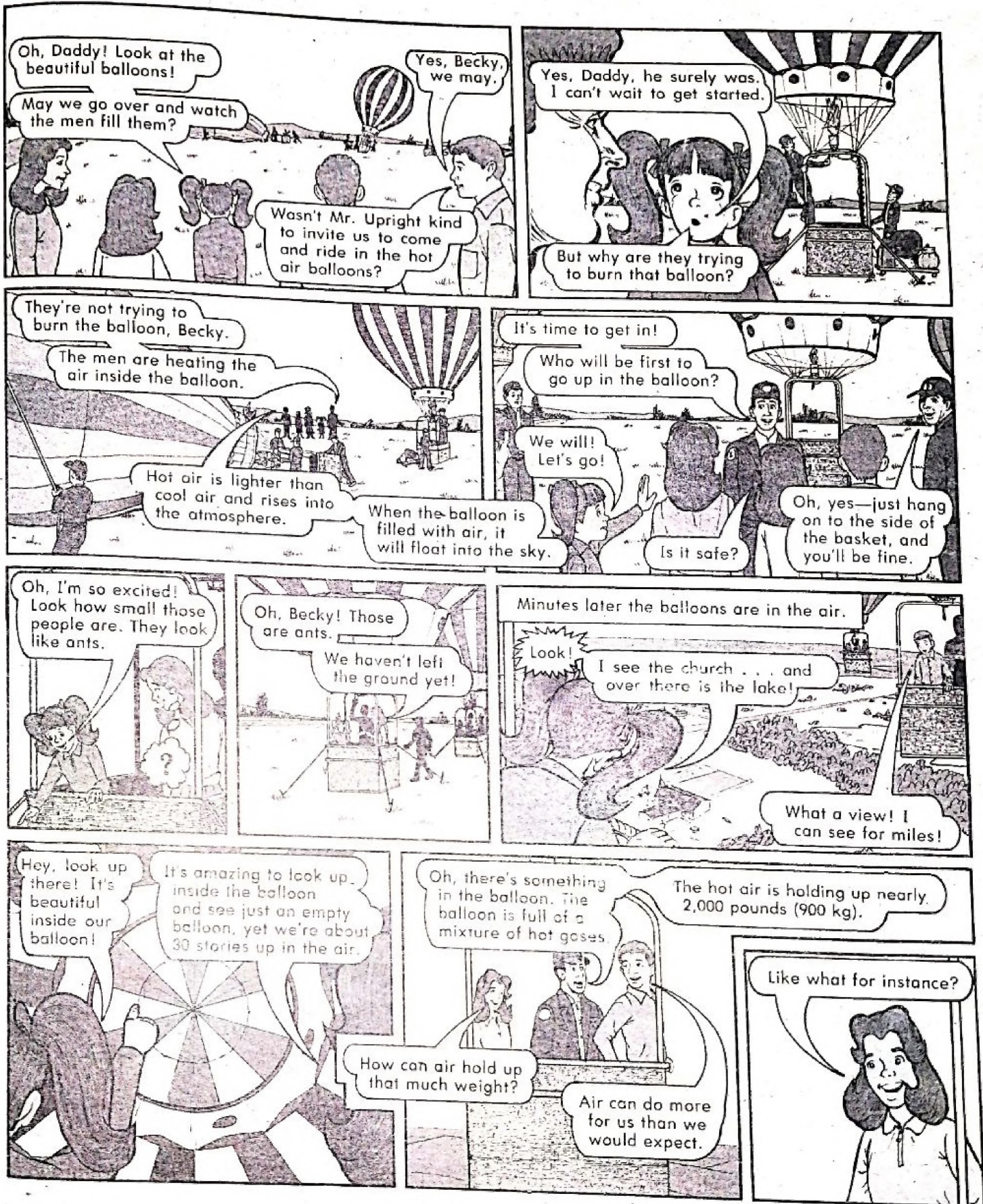


Symbol and Sound Chart

ā = glad	ī = sit	ōō = tool	oi = coin	zh = Asia
ā = save	ī = kind	ū = cup	ou = out	e = ā in above
ā = fair	ō = box	ū = use	sh = she	e = e in the
ā = barn	ō = go	ch = much	th = this, thin	e = ī in easily
ē = best	ō = soft, order	kw = queen	ūr = burn	e = o in lemon
ē = bee	ōō = look	ng = song	z = has	e = u in Jesus

1 (one)

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New Vocabulary for Section One

<u>Word</u>	<u>Pronunciation</u>	<u>Definition</u>
aloft adv.	ə·lôft'	In or to a higher place; high up
argon n.	är'gŏn	a rare, colorless gas
fixation n.	fĭk·sā'shən	the process of fixing; the conversion of a free gas into a useful compound
krypton n.	krĭp'tŏn	a colorless gas with properties similar to argon
meteoroid n.	mē'ti·ə·roid'	a piece of matter moving through space
nuclei n.	nōō'klĭ·ī'	centers; plural of nucleus
proportion n.	prə·pŏr'shən	the relationship of amount or number between two things
radon n.	rā'dŏn	a heavy, radioactive gas
rural adj.	rŏŏr'əl	referring to land outside the city
silicon n.	sĭl'ə·kən	a very common nonmetallic element
variation n.	vār'ī·ā'shən	the act or result of change
volleyball n.	vŏl'ī·bŏl'	a game played by teams over a net; the ball used in the game
xenon n.	zē'nŏn	a heavy gas with a low freezing point

The Atmosphere

Section One

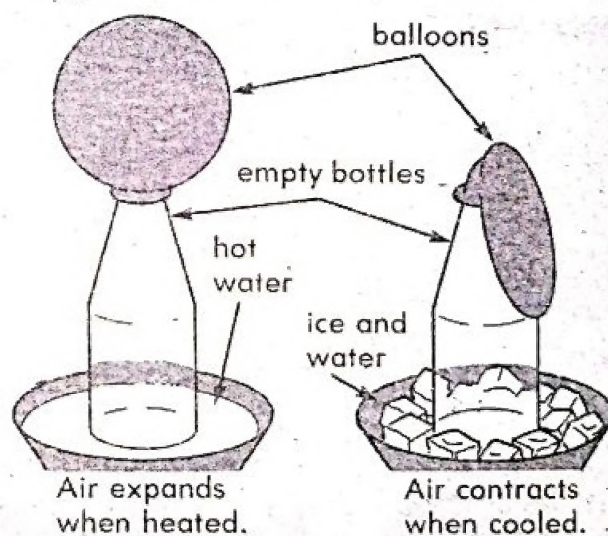
I. The Atmosphere's Make-Up

"The air contains a certain proportion of water vapor, as well as some small solid particles," commented Mr. McMercy.

"Isn't the whole atmosphere composed of the same gases that are in the balloon?" asked Sandy. "How then does heated air rise in cooler air? To me, air should weigh the same whether hot or cold."

Dad answered, "You're right. Equal amounts of hot and cold air do weigh the same. However, gases expand when they are heated. A heated gas takes up much more space than it did when it was cold. Since a heated gas fills more space with the same amount of gas, we say that the heated gas is less dense, or less concentrated. A mass of heated, expanded gas

forming in a mass of cold, concentrated gas



How temperature affects air volume

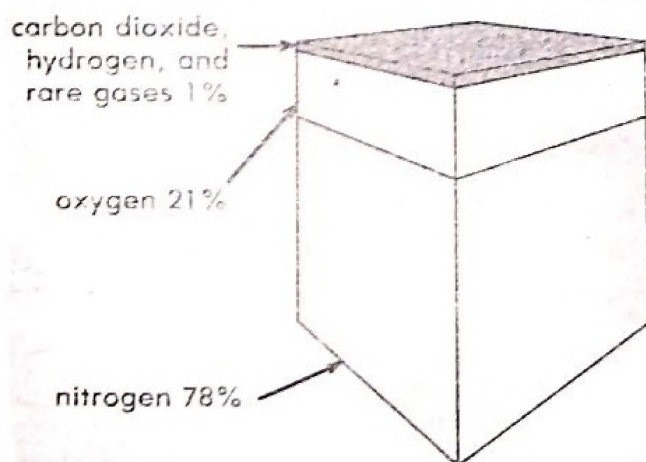
will rise in the cold gas, just as an air bubble will rise to the surface of water. When the balloon contains a mass of heated gas (and air is a mixture of gases), the heated air has enough lifting power to take us up with it.

"Besides using hot air to keep their balloons aloft, men have also used gases that have natural lifting power. Helium is a very light gas often used in balloons because it does not explode. Helium will float upward in air without being heated because it is naturally less dense than air. Hydrogen gas is even lighter and has greater lifting power than helium, but hydrogen gas is much more dangerous to use because it is very explosive."

"What other kinds of gases are in the air, Dad?" asked Sandy.

A. A Mixture

"Most of the air you breathe is nitrogen, Sandy," Dad explained. "About seventy-eight percent (78%) of the atmosphere is nitrogen, and about twenty-one percent (21%) is oxygen, which your body needs to carry on life processes. The other one percent of the atmosphere consists of carbon dioxide, hydrogen, and the rare gases."



Percentages of gases in air

"Carbon dioxide is introduced into the atmosphere every time a person or an animal exhales and every time someone burns a substance containing carbon. Still, carbon

dioxide makes up a very small percentage, only four parts in 10,000 parts, of the total atmosphere.

"Hydrogen is the lightest and simplest of all elements. It is most useful to life on Earth when it combines with oxygen to form water, since water is a part of every living thing."

"The rare gases are called 'rare,'" added Bill, "because together they make up less than one percent of the atmosphere. Some of the rare gases are used in lighted signs. Neon gas lighted the sign in the window of the restaurant where we ate the other night. Glass tubes filled with neon were bent or connected to form the letters in the word 'restaurant.' When electricity passes through the neon, the sign glows a bright red or orange color. Some lighted signs use argon, another rare gas, to fill the tubes. The other rare gases are helium, krypton, radon, and xenon."

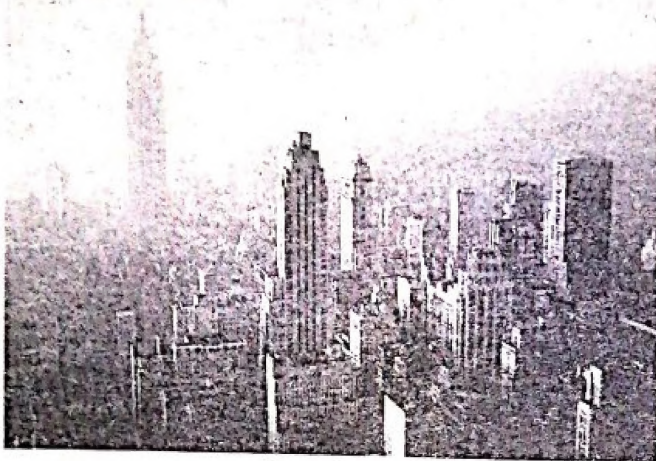
Though paying attention to Bill's comments, Becky looked with wonder at the ground below. Suddenly she gained the balloon pilot's attention and asked, "If the rope that holds us to the ground broke, would we just float up in the sky forever?"

"No," replied the pilot, "the balloon would rise only until the air outside the balloon became too thin to support the balloon's weight. However, I can bring us down quickly if the rope should break."

"Mama, what does the pilot mean when he says the air becomes thin?" asked Becky.

"Well," answered Mother, "the percentages, or proportions, of gases in the air remain the same for many miles (km) above Earth. The higher the altitude, however, the thinner, or less concentrated, these gases become. When you climb on a high mountain at 10,000 feet (3,000 m), you may tire easily. Also, you will breathe deeply because you get less air with each breath. The proportions of gases are still the same on top of the mountain, but the amount of air in a given volume is less."

"Dad, would you look over toward Terra City?" Sandy requested. "You can see a dark

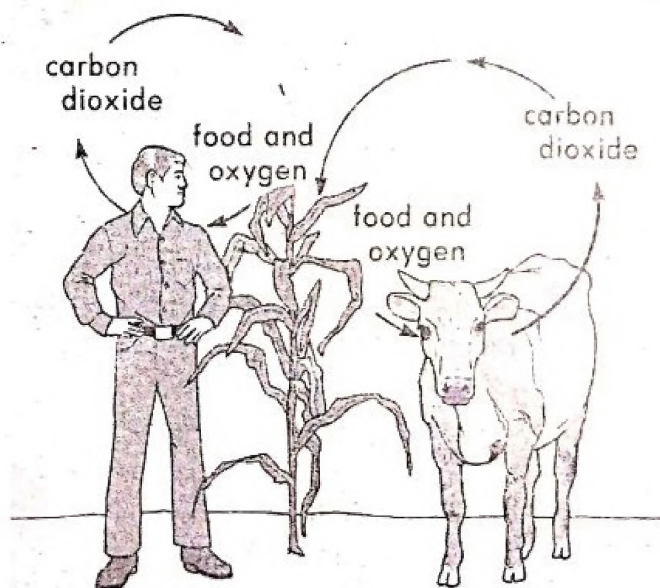


Air pollution

layer of smog hanging over the city. The air over Terra City has some different things in it than the air here, doesn't it?"

"Yes, Sandy," Dad said. "Gases found in the air near Earth do vary slightly in their proportions from place to place. Air pollution is one cause of these local variations. Large cities and industrial areas not only use more oxygen than smaller towns and rural areas but also add to the air certain chemicals and dust not found in other places. Therefore, air pollution is worse over cities having many industries and automobiles.

"Thick plant growth is a second cause of local variations in the air (changes in the proportion of gases). During photosynthesis,



Oxygen-carbon dioxide cycle

plants remove carbon dioxide (CO_2) from the air and release oxygen (O_2). Our food supply is based on this process, which is known as the oxygen-carbon dioxide cycle."

The clouds that had been building in the western sky all morning began to look threatening.

"We had better bring the balloons down now," said the pilot of Becky's balloon. "That thunderstorm will be here soon."

"Oh, I like being up high in the sky!" Becky exclaimed. "Do we really have to come down?"

"Yes, Becky," Mother answered. "Although the ride was to have been longer, we will accept this change cheerfully. God is the One Who controls our lives, and He may change our plans or circumstances at any time. If we understand that God wants only the best for us, we can be flexible and trust Him with our daily plans."

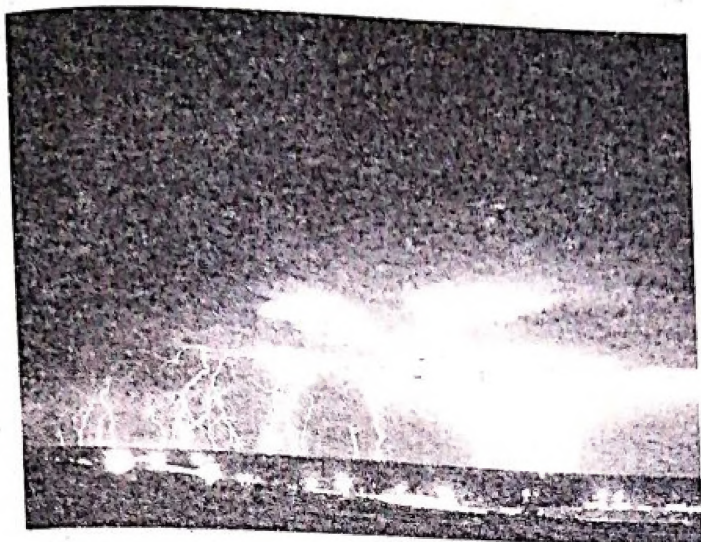
Just as the balloons touched the ground, lightning struck a nearby tree, causing a tremendous boom! Becky jumped and shouted, "Oh, Daddy! What a noise! We had better get into the car and leave!"

"Yes, rain will be falling in a few minutes," replied Dad. "However, the lightning that made you jump is actually a benefit God designed to help plants grow."

"How does lightning do that?" asked Becky.

"Nitrogen fixation is a third cause of changes in the air," explained Dad. "Plants must have nitrogen for fertilizer. Although air is mostly nitrogen, plants cannot use nitrogen directly from the air. Nitrogen gas must be changed, or fixed, into nitrogen compounds that plants can use. Usually these compounds of nitrogen are in the form of ammonia, an important chemical in fertilizers. Ammonia is made in great quantities commercially, but God provides growing things with their own ammonia-making system.

"Lightning is one of two means by which nitrogen gas can be fixed into nitrogen compounds. Lightning bolts pass through a

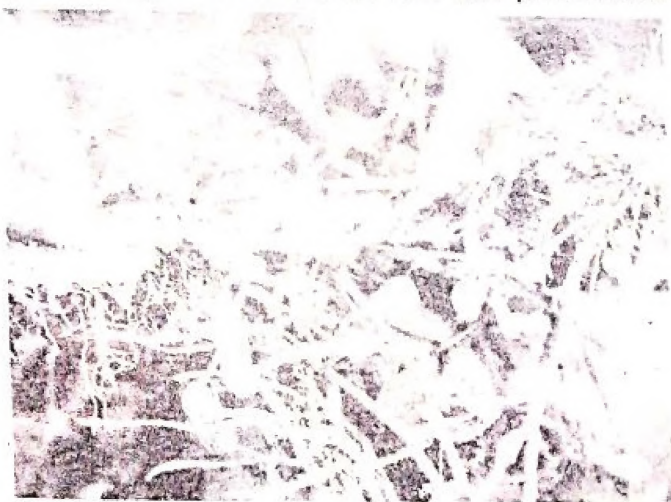


Texas Highways

Lightning changing nitrogen mixture of nitrogen and hydrogen gas to form ammonia. Nitrogen does not react with other elements easily, but lightning gives nitrogen the heat energy needed to combine with hydrogen to produce ammonia. Converting nitrogen in air into a form that green plants can use is just one small way that God provides for His creation. Rain then washes these compounds from the air into the soil where plants can absorb and use them."

"Dad, one of my PACE's stated that, in addition to being fixed by lightning, nitrogen is also fixed by some plants, such as clover," said Sandy.

"Yes, Sandy, nitrogen is fixed by certain soil bacteria that form little balls on the roots of plants, like clover. Nitrogen-fixing bacteria act upon nitrogen from the air that has penetrated



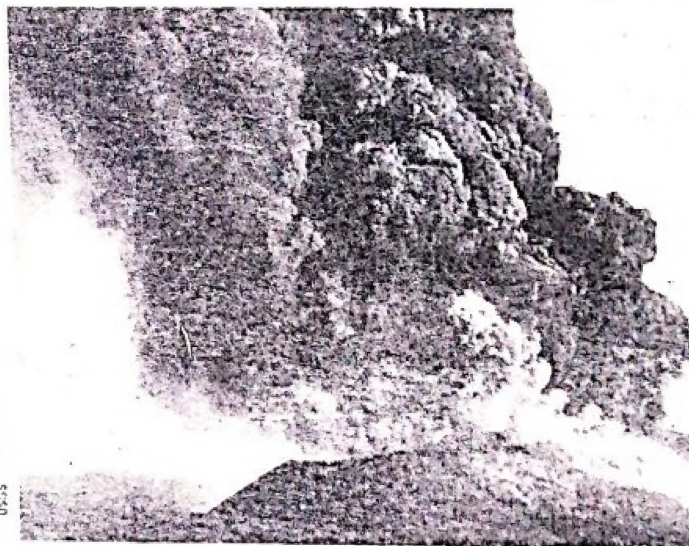
USDA

Nitrogen-fixing bacteria

the ground to change free nitrogen into nitrogen compounds. Plants receive nitrogen compounds from this bacterial fixation process."

"I know a fourth cause of local changes in the air," Sandy offered. "One of the *God and Science* newspapers stated that volcanoes near the equator poured so much ash into the atmosphere one year that the entire Northern Hemisphere was affected by unusually cold weather. Even the sunsets were red because of the ash in the air."

"That's right, Sandy," replied Dad. "Natural occurrences such as volcanic eruptions and forest fires release carbon dioxide, other gases, and solid particles into the atmosphere.



US-25

Volcanic ash given off

Ocean waves release salt particles and water vapor into the atmosphere. Carbon dioxide and oxygen tend to be dissolved into the ocean water by wave action. Now, let's hurry back to the car."

The rain arrived with a violent wind, just as the men finished folding up the balloons and the McMercys were safely in their car.

"That rain is coming down so hard you can't even see the front of the car!" exclaimed Sandy. "How could so much water have been held up in the sky?"

"As you know, Sandy, rain falls from clouds of condensed water vapor," said Dad. "Air can hold large amounts of water vapor, which

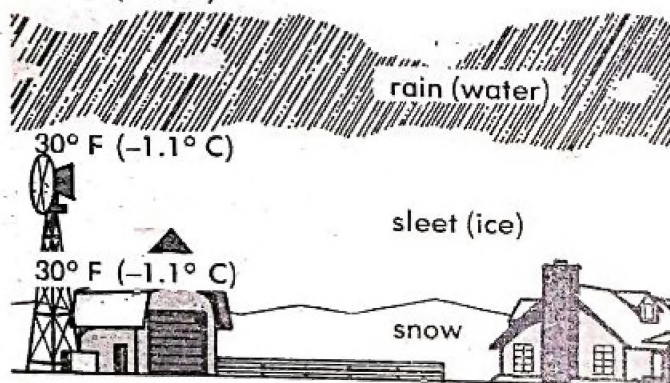
FACTS FROM SCIENCE

If all the water in our present atmosphere were to fall suddenly to Earth, that water would cover all land area to an average depth of about two inches (51 mm).



comes mostly from the evaporation of ocean water. Water vapor, part of air's gaseous mixture, is a fifth cause of local variations in the air. Water vapor returns to Earth in such forms as snow, dew, rain, or frost. The movement of water in the atmosphere is part of the study of meteorology."

35° F (1.7° C)



Types of precipitation

After a few minutes, the rain ended as suddenly as it had begun.

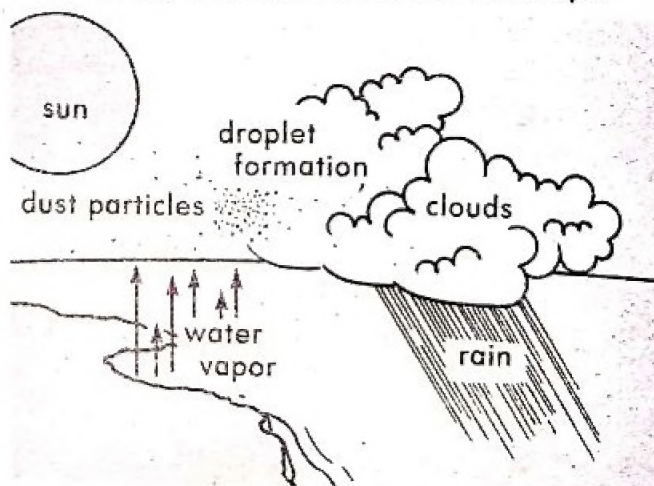
"How clear and fresh the air is now!" exclaimed Sandy. "Maybe we can have a picnic."

"The rain cleaned the air of dirt particles as it fell," explained Dad. "However, the air above the clouds still contains many dirt particles that have been lifted up from Earth, including volcanic dust, smoke particles, sea spray, dust, plant pollen, bacteria, and viruses. These particles fall slowly back to Earth, sometimes requiring years to reach the ground.

"Occasionally you can see tiny dust particles in a room when you look at a beam of sunlight pouring through a window. Dust comes from sources such as soot and bare or plowed

ground. Some scientists have estimated that, on a dry summer day, a space the size of a volleyball contains over two million dust particles.

"Dust particles in the air actually form the nuclei of raindrops. Water droplets that form clouds are attracted to these particles. Therefore, air is cleaned two ways: first, rain falls through dust particles and brings them to Earth, and second, dust particles are taken from the air to form nuclei for raindrops."



Water droplet cycle

"Even particles from outer space are in air," Dad continued.

"How can dust or dirt come from outer space?" asked Bill.

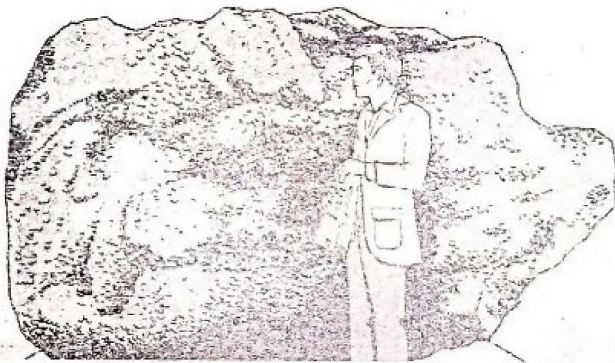
"Do you remember the meteor we saw last night?" asked Dad. "It made a brilliant streak across the sky and was gone. Most meteors burn up as soon as they hit our atmosphere because friction with the air heats them until they burn. Dust from burnt meteors then settles into our atmosphere. Therefore, our atmosphere constantly carries a small load of meteoric dust."

"Dad, what would have happened if that meteor we saw last night had not burned up?" questioned Sandy.

"Occasionally, meteors do strike Earth, but then they are called 'meteorites,'" replied Dad. "Scientists collect meteorites for study because they are bits of our solar system that have come from outside Earth. Studies show them to be made mainly of oxygen, iron, silicon, magnesium, and nickel, along with traces of twelve other elements. All the elements that compose meteorites are elements that already exist on Earth. No new elements have been found in meteorites.

"Meteorites are usually small and do little damage. However, the Museum of Natural History in Terra City displays a meteorite weighing a little over 100 pounds (46 kg).

"In the past, huge meteorites have struck Earth, however. Found at Hoba (hō'bə) West in South-West Africa, the largest meteorite ever discovered weighs about 66 tons. The meteorite's weight is more than ten times as

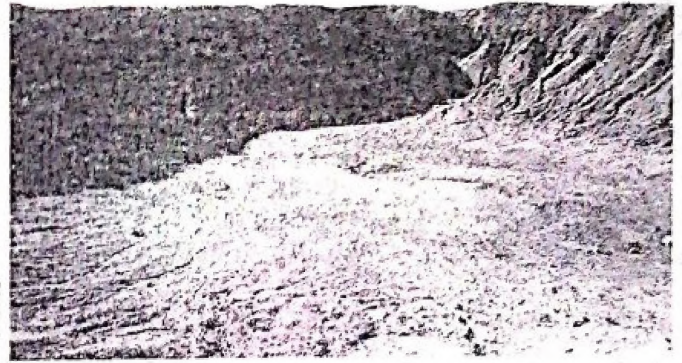


Meteorite

much as the world's largest living land mammal, the African bush elephant!

"The largest meteorite crater in the United States is Great Meteor Crater in Arizona. The largest crater in the world may be the Sudbury (sūd'bēr'ī) Basin in Ontario (ōn-tār'ī-ō'), Canada. This crater is thought to have been caused by a meteorite measuring two to three miles (3 to 5 km) in diameter.

"What do you suppose causes meteors to streak across the sky and fall to Earth?" Dad asked.

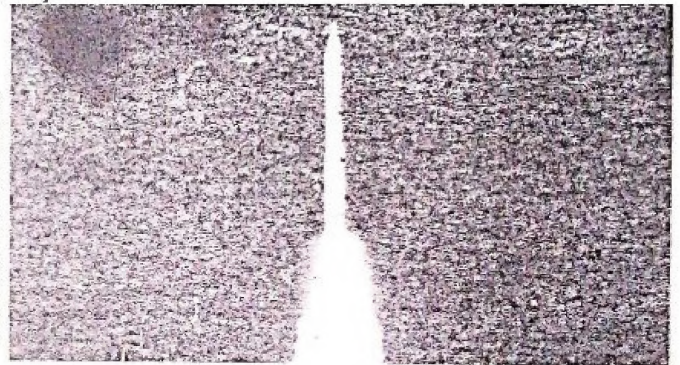


Great Meteor Crater

"Well, you said friction with the air molecules caused the meteor to burn up, but I suppose that Earth's gravity caused the meteoroid to enter the atmosphere in the first place," replied Bill thoughtfully.

"That's right," said Dad. "Gravity also causes meteoric dust to fall to the ground, and gravity holds the atmosphere to Earth. Rockets leaving Earth's gravitational field burn a huge load of fuel to escape Earth's gravitational pull. Heavy objects require a great force to push away from Earth's gravity."

"Gases are so light; why do they not escape Earth's gravitational field?" asked Bill. "They



Rocket flying against gravity

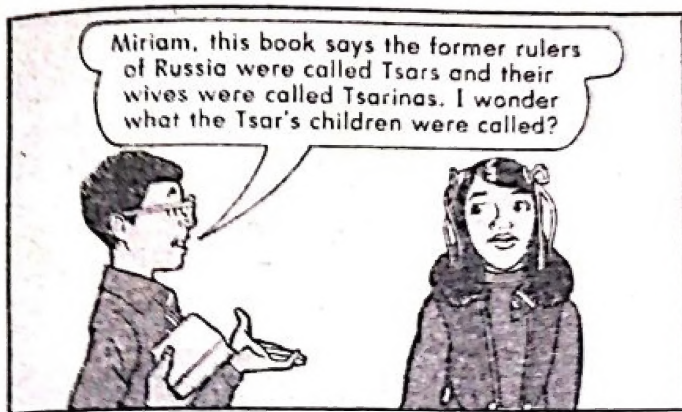
don't seem to need much energy to move around."

"Even though they are light, gas molecules need a force, like a rocket's flaming fuel, to push them away from Earth," replied Dad. "Only a very few gas molecules gain enough energy to escape from Earth's pull into outer space. Lightweight gas molecules, such as hydrogen and helium, escape more easily than heavier molecules of nitrogen and oxygen."

End of Section One

*Do Check Up
p. 3-8*

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Section Two

I. The Atmosphere's Make-Up (continued)

B. Clouds

Presently, the Meekways, the Loyaltons, and the Virtuesons joined the McMercys in the Upright's pasture for a Founder's Day picnic. Also, Reginald came down from his house to be with his friends.

While the families were setting out the food, the boys ran out into the pasture to throw a frisbee back and forth. Racer made the frisbee float through the air like the clouds in the sky. Pudge tried to throw the frisbee to Ace, but it went nearly straight up and down.



"I would like to throw a frisbee like Racer can," said Pudge as the group went back to the picnic tables for lunch.

"Perhaps we need to study how clouds float through the air," joked Bill.

"I don't know how much studying the clouds would help with frisbee throwing, but cloud study is a rewarding subject," Reginald added as they sat down for lunch. "If you can distinguish the types of clouds, you can tell whether rain is on the way."

"Can you tell us how to distinguish the different types of clouds?" asked Racer.

"I think so," replied Reginald. "Clouds are usually distinguished by and named for their appearance. In 1903 Mr. Luke Howard, an English scientist, developed a simple system for naming clouds. Mr. Howard's system is still used today and is known as the Luke Classification System of Clouds."

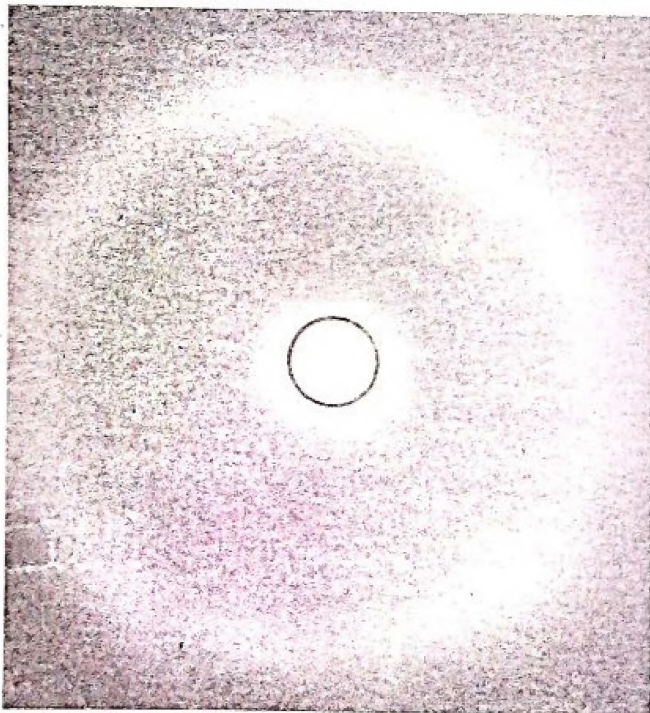
"Do you see the thin, hairlike clouds in the sky? Mr. Howard named them 'cirrus' clouds. Cirrus comes from a Latin word meaning 'lock' or 'curl of hair.' Some people refer to cirrus clouds as 'mares'-tails' because cirrus clouds resemble the long hair of a mare's tail, especially when the mare is running."

"Cirrus clouds are high clouds, occurring at 20,000 feet (6,000 m) or higher. These thin, hairlike clouds are composed of tiny ice crystals. A ring or halo of light often appears around the sun or moon when viewed through these ice crystals. Such a ring is a sign of



Cirrus clouds

changing weather conditions. When the halo appears around the moon, it is called a 'moon dog.' Rain or snow will usually occur within two or three days after cirrus clouds appear."



Moon dog

"Do you remember the rain cloud we saw this morning?" Reginald asked. "Mr. Howard

named that kind of cloud nimbus, a Latin word for 'rain.' Nimbus clouds are dark rain clouds. Towering nimbus clouds with their anvil-shaped tops are known as 'thunderheads.' Towering thunderheads may top out at 55,000



Nimbus clouds

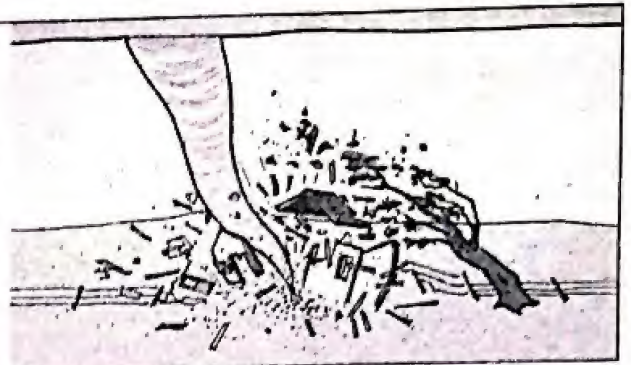
feet (16,800 m) before high winds flatten out the cloud tops into anvil shapes.

"Mr. Howard named fair-weather clouds 'cumulus' clouds. Cumulus is a Latin word meaning 'piled up' or 'heaped.' Cumulus clouds occur anywhere from 1,600 to 35,000 feet (500 to 11,000 m) above the ground. Cumulus clouds look like white, puffy balls of cotton floating across the sky, quite unlike the dark, towering nimbus clouds.

"Cumulus clouds appear as though they might gather and bring much rain. Cumulus clouds are usually signs of fair weather, however, producing only a light drizzle if any precipitation at all. The fact that cumulus clouds sometimes look as though they could produce more rain than they actually do reminds me of a type of person described in Proverbs 25:14. 'Whoso boasteth himself of a false gift is like clouds and wind without rain.'"

FACTS FROM SCIENCE

The sudden decrease of atmospheric pressure may cause a tornado, which can cause a house literally to explode outwardly. The explosion occurs because the pressure inside the house cannot equalize to the pressure outside the house. What Job called a "whirlwind," we call a "tornado."



Cumulus clouds

"Perhaps you can think of the wintertime when clouds are often spread out across the whole sky, making a gray-looking day. Mr. Howard named these wide, flat 'sheets' of clouds 'stratus' clouds. Stratus is a Latin word meaning 'spread out' or 'layered,'" stated Reginald. "Stratus clouds often appear before rainy weather, and drizzling rain may fall for several days. These clouds are usually low in the sky, below 6,500 feet (2,000 m)."

"I don't know if I can remember all those words," said Pudge.

"Try these suggestions for remembering the names," offered Reginald. "Listen in the names for the parts you already know. Do you remember the word 'strata' (strāt'ə), which refers to rock layers? Remember that layers of

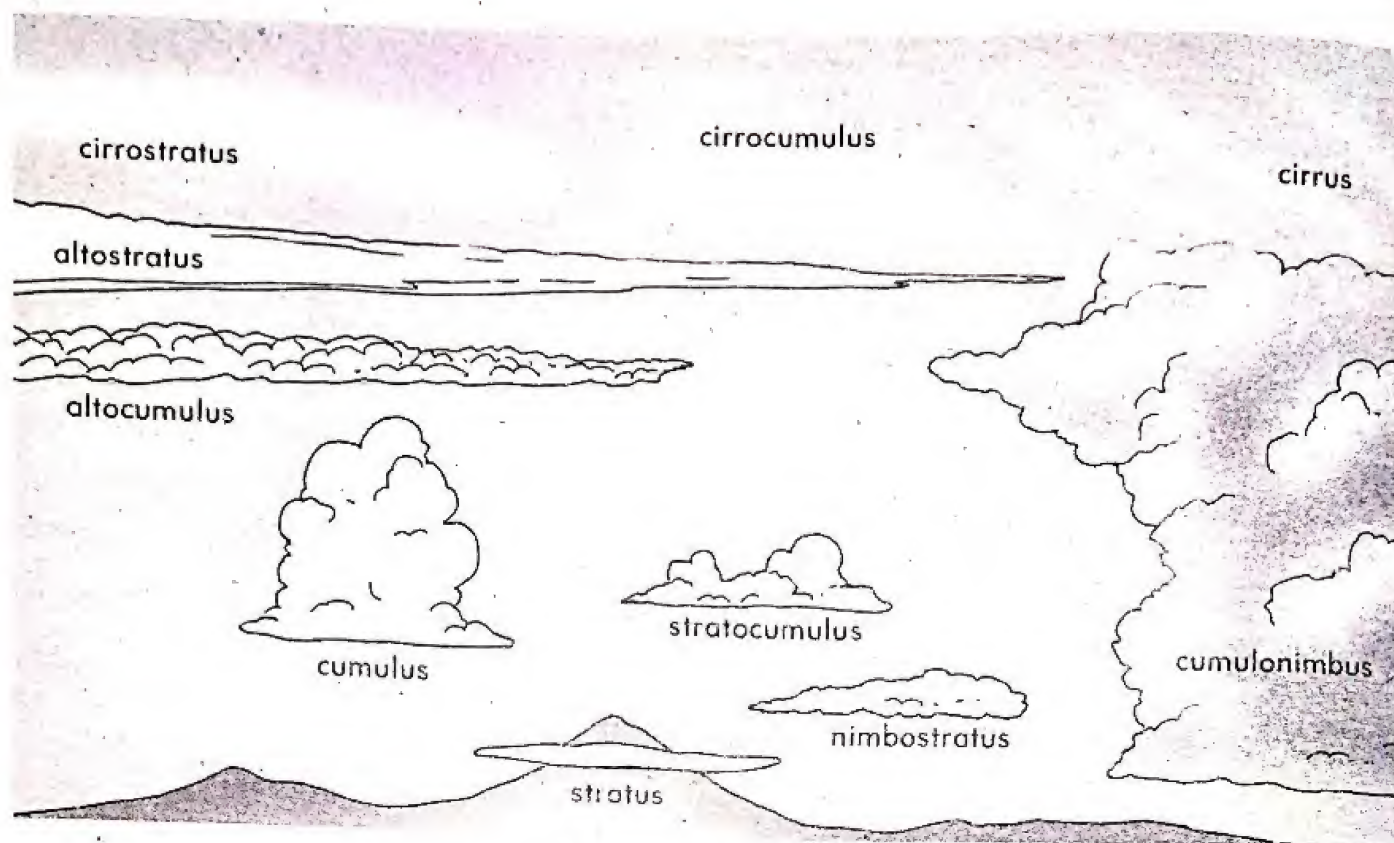


Stratus clouds

clouds in the sky are called 'stratus' clouds. What about the word 'cumulus'? Have you ever watched big, puffy clouds ac-CUMUL-ate over mountains? Cumulus clouds pile up in the sky.

"Meteorologists often combine cloud names when identifying cloud conditions. For instance, layers of cumulus clouds are called 'stratocumulus' (strāt'ō-kū'myē-lēs) clouds. Sometimes nimbus clouds look as though they are heaped up in the sky and resemble cumulus clouds. These clouds are then called 'cumulonimbus' (kū'myē-lō-nīm'bēs) clouds. Cumulonimbus clouds may produce tornadoes.

"Meteorologists also use prefixes when describing different clouds. For example 'alto-' (āl'tō) is a prefix that refers to extra high clouds. Stratus clouds usually occur low below 6,500 feet (2,000 m). When they



Composite of cloud types

occur higher than usual, between 6,500 and 20,000 feet (2,000 and 6,000 m), they are called 'altostratus' (ăl'tō-străt'es) clouds. Cumulus clouds at that height are called 'altocumulus' (ăl'tō-kū'myā-ləs) clouds.

"At their greatest heights, above 20,000 feet (6,000 m), stratus and cumulus clouds are called 'cirrostratus' (sir'ō-străt'es) or 'cirrocumulus' (sir'ō-kū'myā-ləs) clouds. Cirrostratus clouds are layers of cirrus clouds. Cirrostratus clouds look like high, thin, feathery sheets of clouds. When these clouds of ice crystals pass in front of the sun or the moon, they also cause halos around the sun or the moon. As with cirrus clouds, the formation of halos indicates the approach of rain or snow. Cirrocumulus clouds look like white flakes or cotton high in the cold sky. When cirrocumulus clouds form in lines or groups, they are a signal that precipitation will soon occur."

C. Layers

As they were eating lunch, Racer asked, "Did you fellows hear about one spy plane that

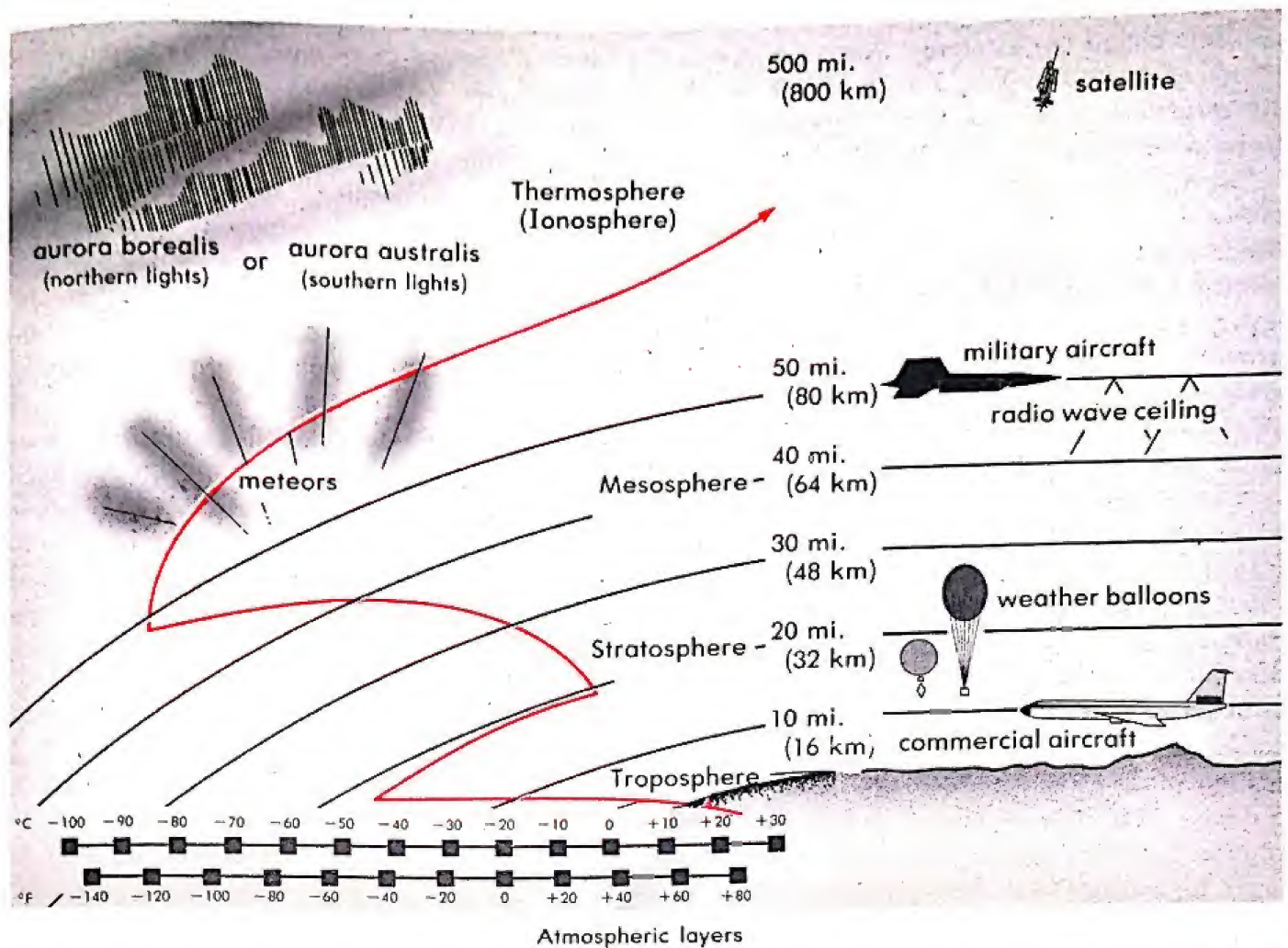
can fly three times the speed of sound (740 mph; 1,190 km/h), at an altitude of more than fifteen miles (24 km)? At first, the spy plane flew too fast for its camera to take good pictures of the ground, but scientists have designed a camera that can take pictures in which even automobile license tags are readable."

"Here is something else amazing," said Reginald. "An experimental military rocket plane can actually fly three layers above the ground!"

"Three layers of what? I don't understand what you are saying," Pudge said.

"Well, the atmosphere, as you know, changes as you go farther up into the sky," answered Reginald. "Although you can't see them, our atmosphere has four distinct layers that are different from each other in several ways.

"All of us live in the thick bottom layer of the atmosphere called the troposphere, which means 'place of change.' The troposphere is the layer of weather changes and cloud formations. Since it is the layer of air that

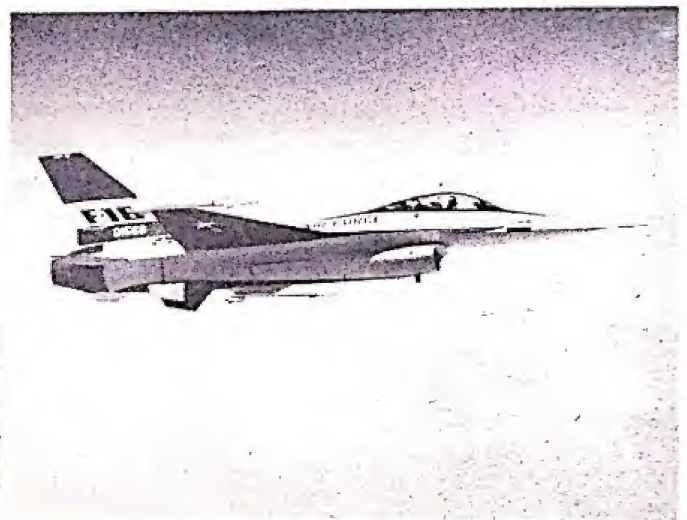


touches Earth's surface, the troposphere is affected by Earth's surface conditions. For example, heat reflected by Earth's surface warms the air near the surface so that it rises. When this happens, clouds form, and our weather changes."

"How thick is the troposphere?" Pudge asked.

"My weather book says that the troposphere extends five to ten miles (8 to 16 km) above the ground," replied Reginald. "The troposphere is thickest (10 miles or 16 km) over the equator and thinnest (5 miles or 8 km) over the poles. The temperature changes greatly as you ascend into the troposphere. The temperature may be 60° F (16° C) at Earth's surface but -60° F (-51° C) at the top of the troposphere."

"My dad and I flew in a jet airplane at 35,000 feet (11,000 m)," said Racer. "That's



General Dynamics Corporation

Jet flying in the troposphere about six miles (10 km) up in the troposphere."

"Yes, jet airplanes often travel near the top of the troposphere," replied Reginald. "Pilots have found in this layer some useful wind

currents called 'jet streams.' Some jet streams travel nearly 500 miles per hour (800 km/h). Jet airplanes make use of jet streams in the troposphere to help them travel faster.

"Earth's daily cycle of heating and cooling produces low-altitude jet streams over flat areas such as the Great Plains. These low-altitude jet streams form at night. Occurring as low as 1,000 to 2,000 feet (300 to 600 m) above ground, these strong winds may not even be noticeable at ground level. They may be very shallow, but they can blow at speeds as high as 80 miles per hour (130 km/h).

"Before the next major layer begins, the troposphere comes to an end. The troposphere's temperature steadily decreases the higher you go in the layer. At the top of the layer, the temperature suddenly stops decreasing, marking one layer's end and another layer's beginning. A layer's end is called a pause, which means 'a stopping or resting place.' Each atmospheric layer ends in a pause. The pause is the boundary marking a change in atmospheric conditions from one layer to another. The troposphere ends at the 'tropopause' (tröp'ə-pôz'). The tropopause is not at the same height all over Earth, but varies in height according to location and temperature."

"I know that the atmosphere near the tropopause must be very thin," offered Racer. "The flight attendant on our airplane demon-

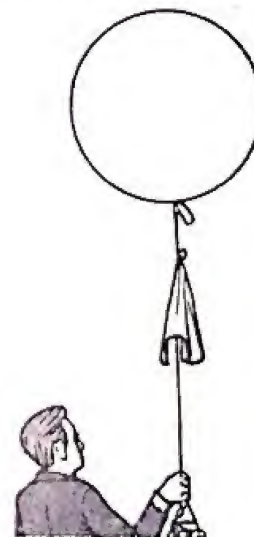


Flight attendant demonstrating oxygen mask

strated the use of an emergency oxygen mask. Passengers would need oxygen if the plane cabin suddenly lost air pressure."

"Reginald, you stated that the spy plane flies in the third atmospheric layer," Sandy said. "I know now that the lowest layer is the troposphere, but what are the second and third layers called?"

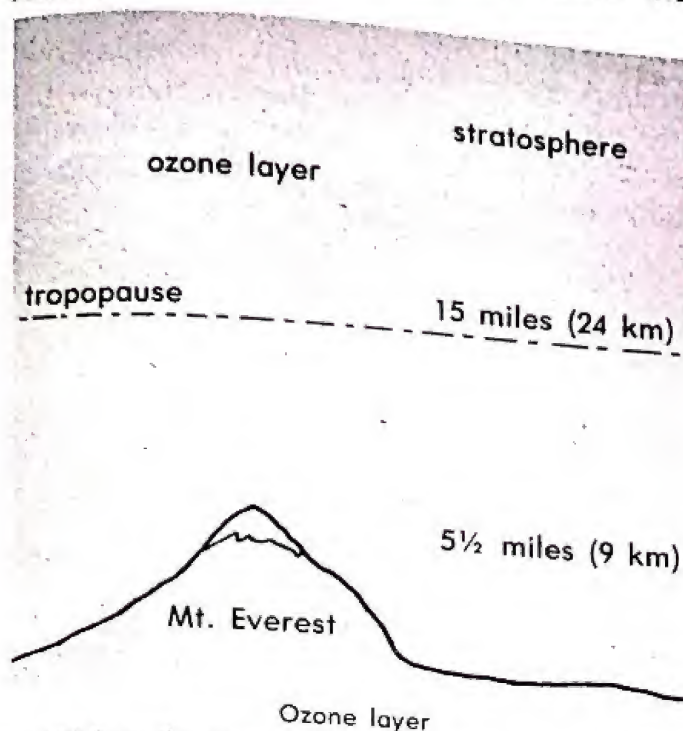
"The second atmospheric layer is the stratosphere, extending from the tropopause to about twenty or thirty miles (30 or 50 km) above Earth's surface," Reginald answered. "The higher the altitude of the stratosphere, the more the temperature increases. Meteorologists often send weather balloons up into the stratosphere to gather information. Weather balloons carry instruments that broadcast temperature, pressure, and humidity information to weather stations."



Weather balloon

"The stratosphere contains the blanket of ozone surrounding Earth. Very high energy radiation from the sun strikes oxygen molecules in the upper atmosphere and converts some of them into ozone. Ozone differs chemically from the normal oxygen molecule in that ozone has an extra oxygen atom. Normal oxygen molecules have two oxygen atoms. Ozone has three oxygen atoms in its molecule, making ozone's chemical formula O_3 . The third oxygen atom can easily separate from the other two atoms, making

ozone a very chemically active gas. Ozone is especially concentrated in the lower stratosphere about 15 miles (24 km) above the surface."



"Although ozone is present in the stratosphere as only six parts of ozone to one million parts of air, ozone forms an effective protective shield that absorbs large amounts of ultraviolet radiation from the sun. Ultraviolet rays harm living tissues, and without this protective layer, life on our planet probably could not exist."

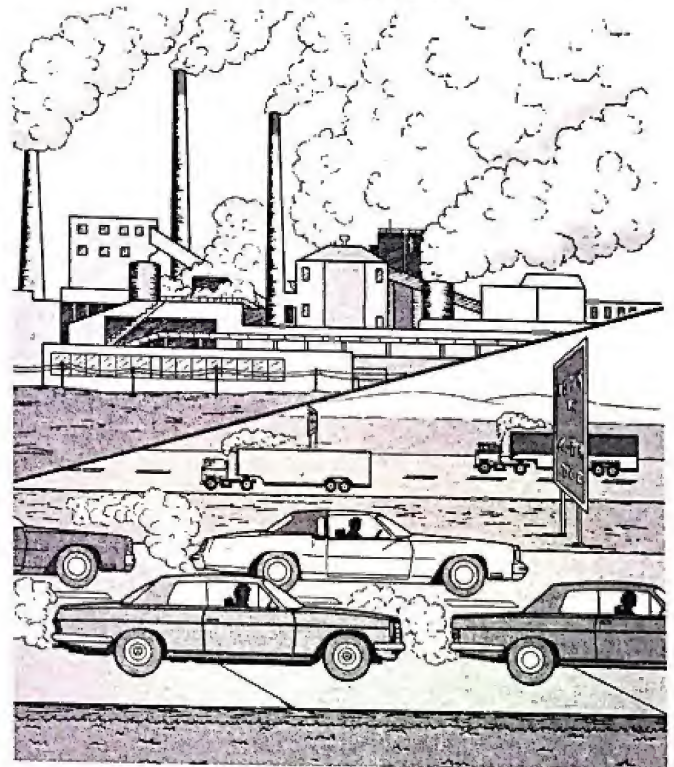
"The ozone blanket reminds me of the hedge God placed around Job," commented Bill. "Satan was not able to harm Job and complained to God, 'Hast not thou made an hedge about him, and about his house, and about all that he hath on every side?' (Job 1:10a). Dad says that if we trust God, we will also have God's hedge of protection around us."

"I heard that a gas from spray cans reduces the amount of ozone so that our shield against radiation is broken down slightly," offered Pudge.

"Yes, however, most spray cans now use a gas that will not harm the stratosphere's ozone," replied Reginald.

"The sun's radiation is not the only source of ozone. Electric sparks, such as those from electric motors or from lightning, also form ozone. People can detect the presence of ozone easily since it has a very sharp smell.

"Breathing too much ozone can permanently damage a person's lungs, and many industries and automobiles give off much ozone as they operate. For this reason, public health services in large cities constantly monitor the concentration of ozone in the air and give frequent reports about the ozone levels."



Sources of ozone

"Is ozone part of the air pollution we saw over Terra City today?" asked Bill.

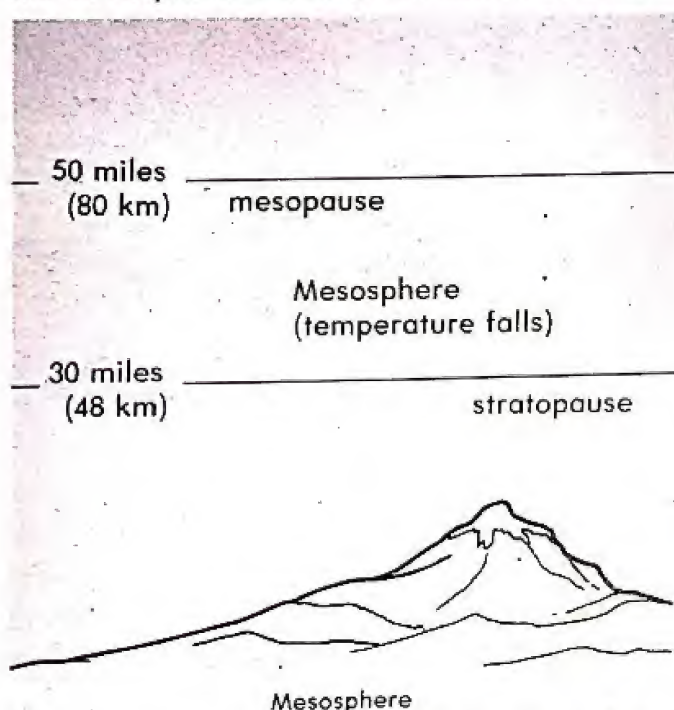
"Yes, Bill, you're right," said Reginald.

"I can see that the ozone layer is a very important part of the stratosphere," said Pudge. "What is the third layer of the atmosphere where the spy plane flies? I want to know more about that."

"The stratosphere ends with the stratopause (strāt'ē-pōz'), which is about 30 miles (50 km) above Earth's surface," replied Reginald. "Above the stratopause is the mesosphere in which the spy plane flies."

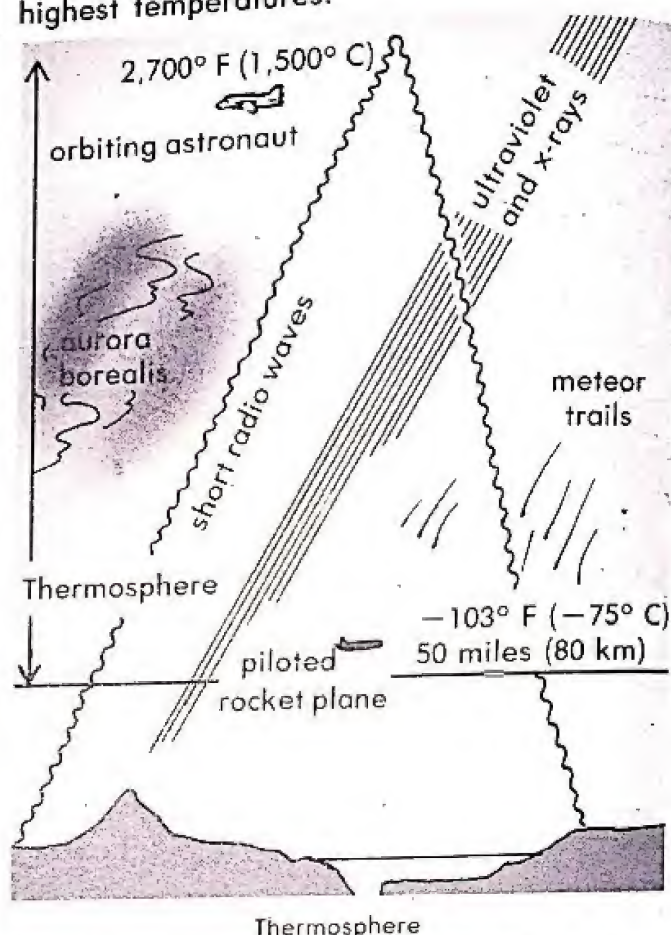
Temperature in the mesosphere decreases steadily to about -140°F (-96°C) at the top of the mesosphere and is the atmosphere's lowest temperature. In spite of the cold, however, the spy plane flies so fast that it needs a special metal surface to protect it from frictional heat. The mesosphere ends at the mesopause (mēs'ə·pōz'), about fifty miles (80 km) above Earth. The mesopause is the point at which the mesosphere's temperature stops decreasing."

"There must be very little air in the mesosphere," said Racer, "because the higher the atmosphere altitude, the thinner the air."



"Yes, Racer, the air there is very thin," explained Reginald. "More than ninety-nine percent (99%) of the mass of Earth's atmosphere lies below the stratopause. About half of that mass lies within three and one-half miles (5.6 km) of Earth's surface. Though our atmosphere extends hundreds of miles (km) above the surface, air is very thin for most of that distance. Gas molecules are much farther apart in the outer three layers of the atmosphere than they are in the troposphere. Air molecules are also more active near outer space because of energy given them by the sun's rays."

"Above the mesopause, air becomes warmer again because the sun's rays heat the widely scattered molecules without first being filtered through other air layers. This warmer atmospheric layer, the fourth from Earth's surface, is called the thermosphere. Temperature of the thermosphere rises to $2,700^{\circ}\text{F}$ ($1,500^{\circ}\text{C}$) at the thermopause (thûr'mə·pōz'), producing the atmosphere's highest temperatures."



"Atoms are normally balanced in their electrical charges. Their nuclei have positive charges, and their electrons have negative charges equal to their positive charges. As the sun's energy strikes air molecules of the thermosphere, some electrons are knocked off the atoms. These atoms are then thrown out of electrical balance and become positively charged. Charged atoms are called 'ions' (ī'ənz). The part of the thermosphere where ions are found in abundance is known as the ionosphere. Northern and southern lights, or 'auroras,' occur in the ionosphere."



"The weatherman on the radio said that the aurora borealis, the northern lights, were particularly brilliant at night this week," said Racer.

"I didn't see them!" exclaimed Sandy.



Aurora borealis

"No, northern lights are usually visible only in the northern latitudes of the Northern Hemisphere," explained Bill. "Most northern lights can be seen from Alaska, northern U.S., Canada, and Siberia."

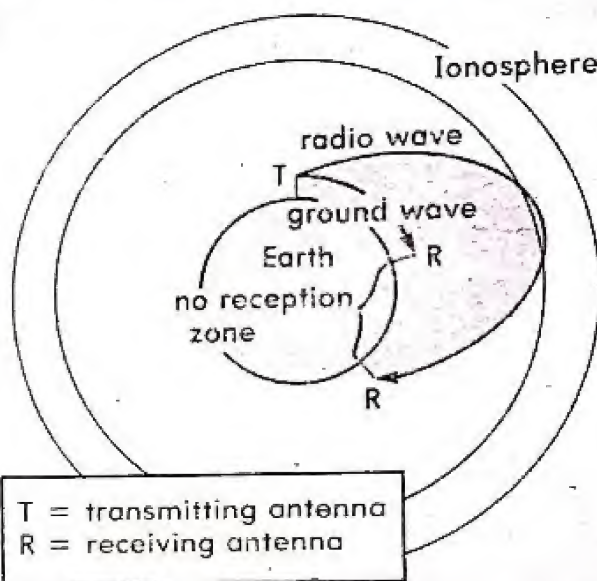
"I'm glad you mentioned the radio," replied Reginald. "Every night I can pick up the preaching broadcast all the way from the local station in Corpus Christi (kôr'pes krîs'tî), Texas, because of the ionosphere."

"What could the ionosphere possibly have to do with radio broadcasts?" questioned Pudge.

"A layer of ions at the base of the ionosphere acts as a radio-wave mirror," answered Reginald. "The ions bounce radio waves broadcast from Earth back toward Earth

many miles (km) from their origin. This 'bouncing back' makes possible a long-range radio broadcast. Of course, broadcasting from satellites to Earth is a more effective and exact way of beaming radio signals to Earth, but use of the ionosphere is free!"

Bill commented, "The troposphere, stratosphere, mesosphere, and thermosphere are



T = transmitting antenna
R = receiving antenna

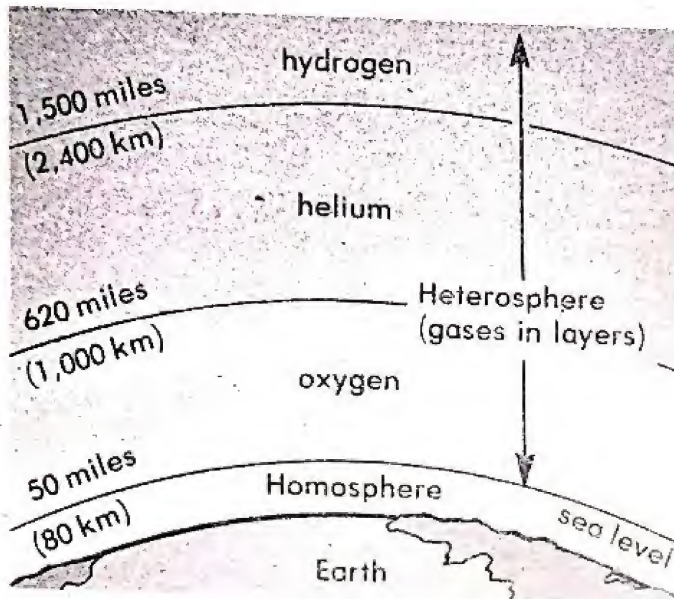
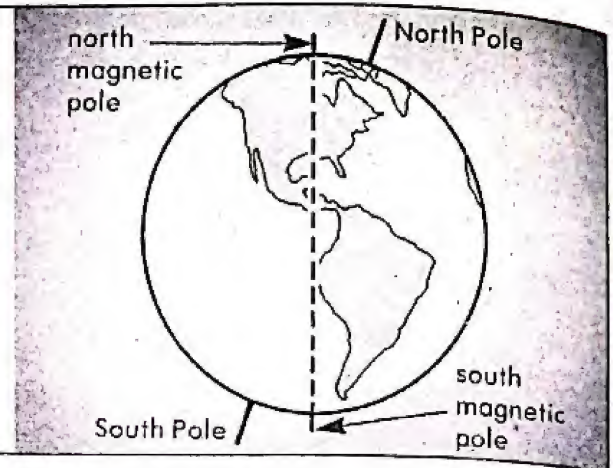
Radio-wave mirror

classified according to temperature. The atmosphere can also be classified into layers according to the way the different gases are mixed together in the air.

"Gases within the atmosphere from sea level to fifty miles (80 km) high are thoroughly mixed together. They do not separate from each other to settle to the bottom or rise to the top. The percentages of the gases found in this

THE POLAR PUZZLE

Do you know that Earth has two North Poles and two South Poles? It's true! "How is that so?" you ask. Well, Earth has a set of geographical poles and a set of magnetic poles. The north magnetic pole is located near Bathurst (băth'erst) Island, Canada, 1,000 miles (1,600 km) from the North Pole; and the south magnetic pole is located in Wilkes (wīlks) Land, Antarctica, 1,600 miles (2,570 km) from the South Pole.



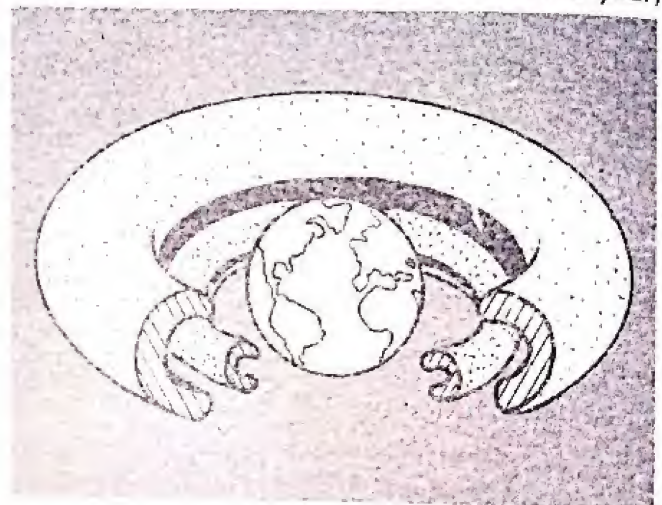
Homosphere and heterosphere mixture remain about the same. Scientists refer to this layer of mixed gases as the homosphere. The word 'homo' (hō'mō) means 'same.'"

"Then, according to what Reginald said, the troposphere, stratosphere, and mesosphere make up the homosphere," said Ace.

"That's right," continued Bill. "Above this fifty-mile (80-km) layer are layers of unmixed single gases. The first layer above the homosphere consists of oxygen, the second layer is of helium, and the third layer is of hydrogen. This area is called the heterosphere. 'Hetero' (hēt'er-ə) means 'different.'"

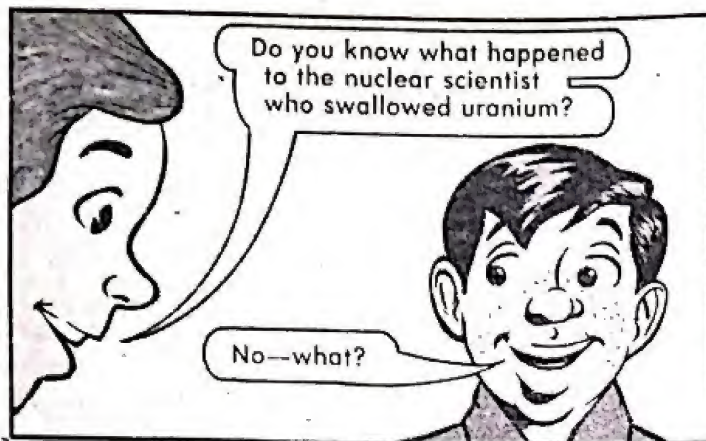
Reginald began talking again, "Also, far out in space, surrounding our planet's equator, are two doughnut-shaped halos of protons and electrons that many scientists consider to be an

extension of the atmosphere. They call this region the magnetosphere. Protons and electrons of the magnetosphere have erupted from the sun and have become trapped in Earth's magnetic field. Dr. James Van Allen (văn ăl'en) discovered the magnetosphere in 1958 when America's first man-made satellite, *Explorer I*, radioed information about the inner radiation belt back to Earth. The same year,



Magnetosphere

America's *Pioneer III* indicated to scientists the existence of the outer radiation belt. Some physicists think of the magnetosphere as two distinct belts, which they call the 'Van Allen radiation belts.' Other physicists think of the magnetosphere simply as one large region. In this region the protons and electrons spiral around Earth's magnetic lines of force and move quickly back and forth between the poles as the particles follow the flow of magnetic force."

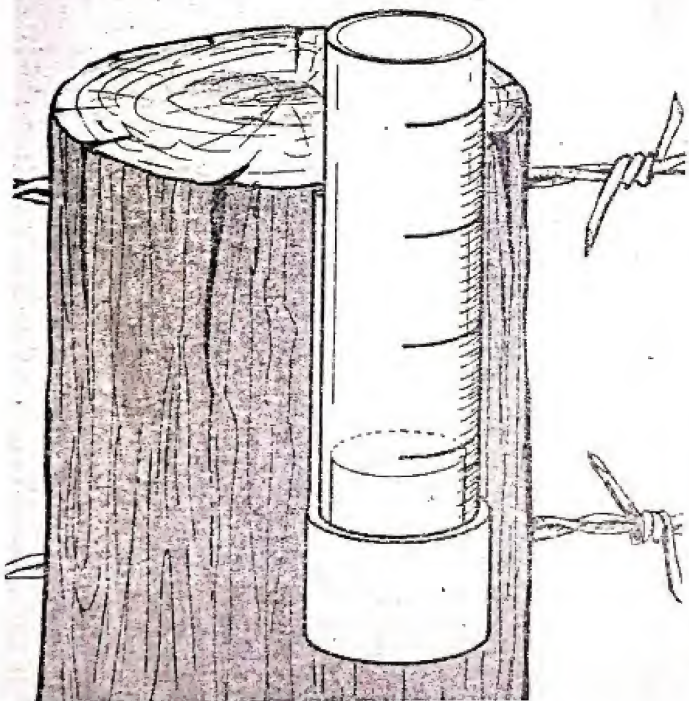


Section Three

II. The Atmosphere's Measurable Qualities

Later that afternoon, after Ace and his family arrived home, Mr. Virtueson suggested, "Let's go outside and check our little weather station, Ace. I want to know how much rain fell this morning so that I'll know whether to water the lawn later this week."

They went outside to the fence beside the garage, and Dad lifted the glass tube from the gauge on the fence post. "Hmmm, .15 of an



Rain gauge

inch (.38 cm) of rain," he said. "Well, maybe that will keep the lawn green until next Saturday."

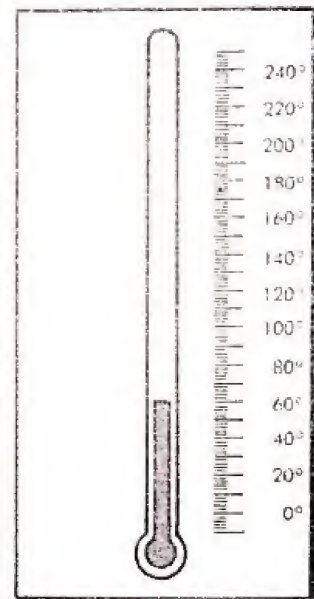
A. Temperature

"Dad, the thermometer on the side of the garage reads 92° F (33° C)," Ace remarked. "Today is really a warm day."

"Yes, it is," agreed Dad.

"Dad, I know that the red liquid in the thermometer rises in the glass tube when the weather is hotter, but I don't understand why," Ace said. "Can you explain that to me?"

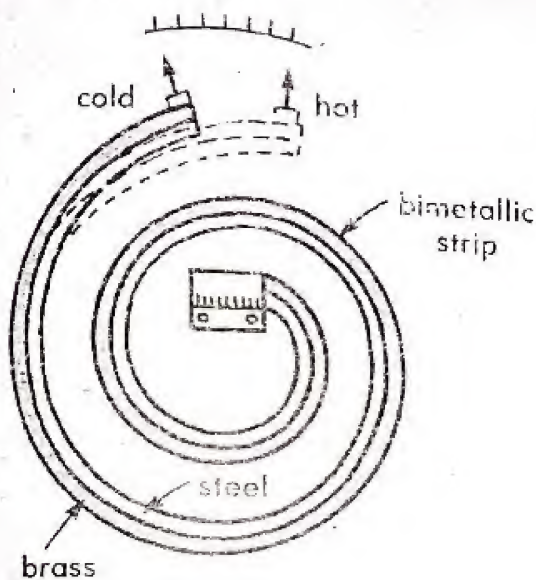
"Well, most liquid thermometers are based upon the expansion of a colored chemical inside a glass tube," explained Dad. "The chemical expands with heat and contracts with cold. This liquid moves inside the glass tube, which is marked off in small numbered divisions called 'degrees.'"



Fahrenheit thermometer

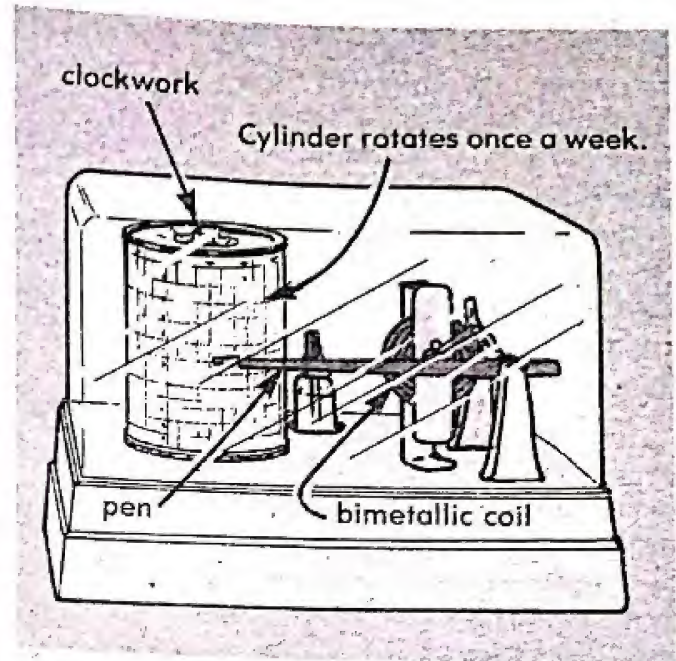
Maximum Inc

"Thermometers used for scientific purposes are sometimes made of metal strips that have been bonded together. These thermometers work on the principle that different metals react differently to heat and cold. When strips of two different metals are bonded together, one will expand or contract faster than the other as the temperature rises or falls. This difference in metals makes the two-metal strip bend when the temperature changes, and this action causes a needle to move across a dial. Such a thermometer is called a bimetallic thermometer. Bimetallic means that two metals are used in the thermometer. A bimetallic thermometer gives accurate temperature readings to within $.9^{\circ}\text{ F}$ ($.5^{\circ}\text{ C}$)."



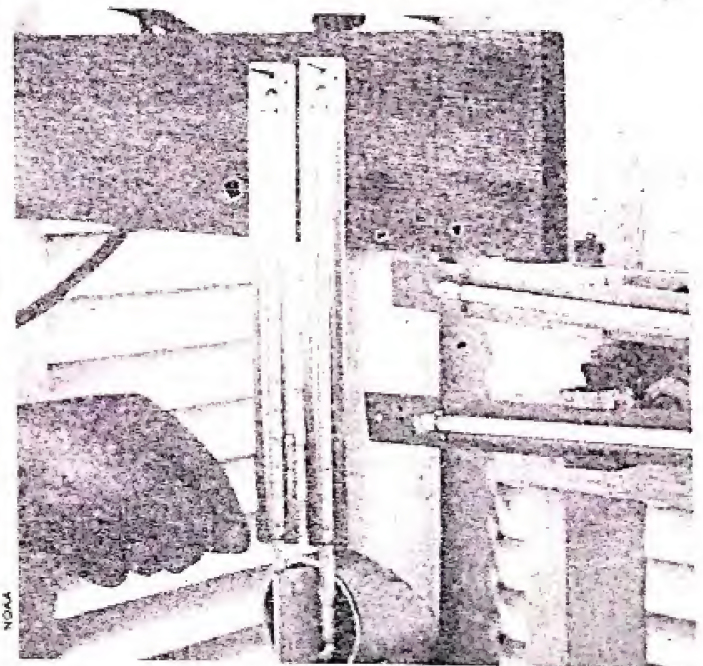
Bimetallic thermometer

"A device called a thermograph measures temperatures over a period of time. A thermograph has a pen on the end of the metal strip of a bimetallic thermometer. Graph paper mounted on a cylinder turns at a steady speed. When the metal strip bends, the pen moves up and down on the paper. The pen uses a special ink made of glycerin that will not easily freeze or evaporate. Many thermographs record temperatures for a week on graph paper that is divided into days and hours."



Thermograph

"Meteorologists also use maximum and minimum thermometers to gather information about weather during specific periods of time. The maximum thermometer records rising temperatures, but when the temperature begins to fall again, the maximum thermometer indicator remains at the highest temperature recorded during the time period for which the thermometer has been set. In the same way, a minimum thermometer indicator stays



Maximum and minimum thermometers

at the lowest temperature recorded during the time period for which it has been set. When a maximum thermometer and a minimum thermometer are combined in the same instrument, the instrument is then called a maximum-minimum thermometer."

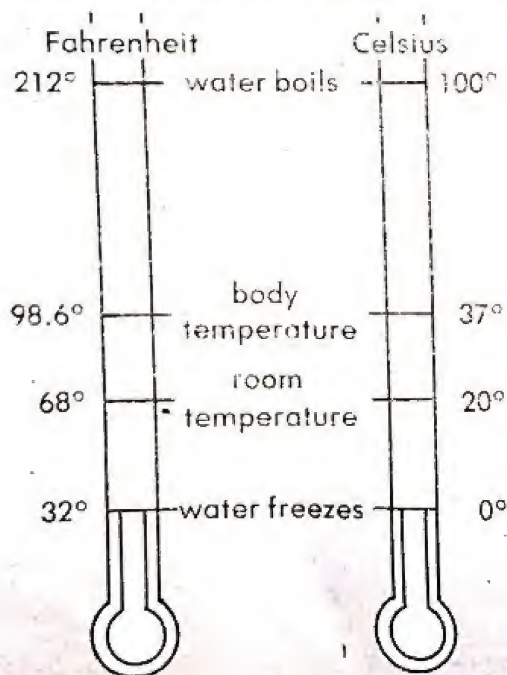
"The sign on the bank downtown gives the temperature in two different readings, Dad," commented Ace. "I know one is Fahrenheit, but what is the second reading, and why does the bank give it?"

"Well, in the United States, we usually use the Fahrenheit scale to record temperature," replied Dad. "Gabriel Daniel Fahrenheit, a German-Polish (pō'līsh) scientist, invented the Fahrenheit scale when he designed his first thermometer in 1714, using mercury in a glass tube. Mr. Fahrenheit cooled a container of pure water in a mixture of ice and salt. He produced the coldest temperature he could when he mixed ice and salt water together. When the glass tube of mercury was placed in the experimental mixture, the level of the mercury sank in the tube. When the level sank no lower, Mr. Fahrenheit chose that point as 0. For the high point of the temperature scale, Mr. Fahrenheit chose the point to which the

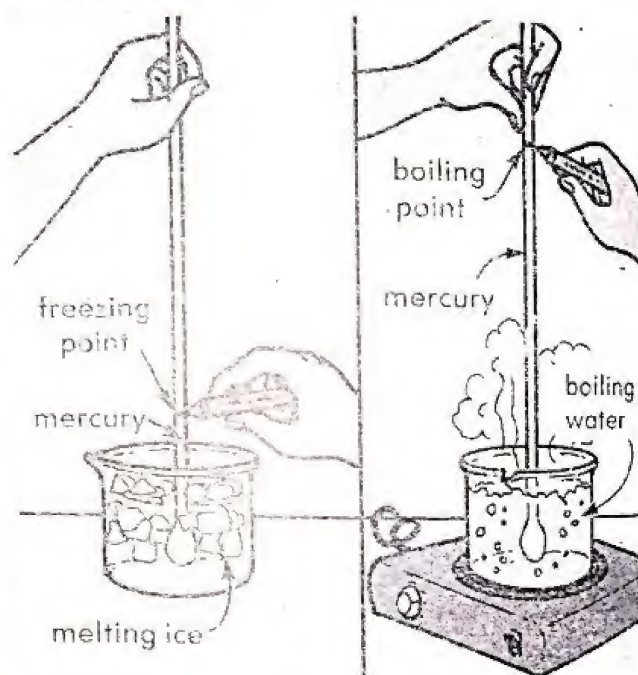
mercury in the tube rose when placed in contact with the human body. Then he divided the distance between the high and low points into 96 equal degrees. Later experiments, however, showed the temperature of the body to be 98.6° F (37° C).

"Mr. Fahrenheit found that water without salt freezes at 32° F (0° C). When he heated water, he found that it boils at 212° F (100° C). The difference between the freezing and boiling points of water in the Fahrenheit scale is 180 degrees.

"Then, in 1742, Anders Celsius (än'ders sēl'sī-əs) and Carl Linnaeus introduced another thermometer that we know as the Celsius-scale thermometer. The Celsius-scale thermometer fixes water's freezing point at 0 degrees, and water's boiling point at 100 degrees. This scale fits very well with the metric system of measurement that measures everything in units of ten."



Two temperature scales



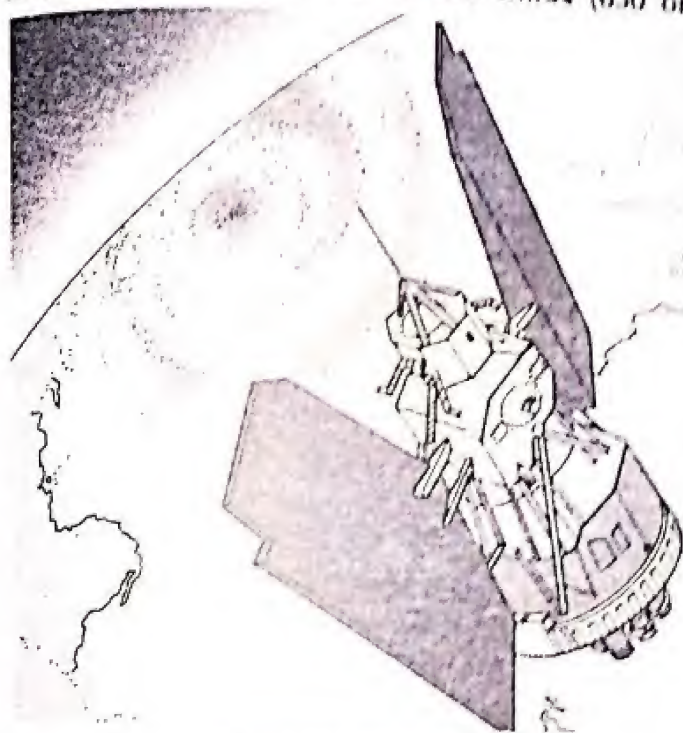
Determining 0° and 100° Celsius

"Scientists report temperature readings in degrees Celsius. The Celsius thermometer is used by most nations and all scientists. Also, meteorologists usually report their atmospheric findings in degrees Celsius. In former years, the Celsius thermometer was known as the centigrade-scale thermometer."

"Dad, I have noticed in the weather reports that temperatures vary greatly nationwide—and even a few degrees in our local area," said Ace.

"Yes, local conditions greatly affect the temperature of the atmosphere near Earth," Dad replied. "The temperature of any particular area can be checked by placing a thermometer in a protected container four feet (1.2 m) above the ground. Temperatures in the lower troposphere are called 'surface air temperatures.' People are most comfortable at temperatures between 70° and 75° F (21° to 24° C).

"Weather information is now exchanged worldwide. The World Meteorological Organization makes regular reports from its center in Geneva, Switzerland. Space satellites and other devices that collect information make possible the sharing of weather information with scientists everywhere. Most weather satellites orbit about 400 or 500 miles (650 or

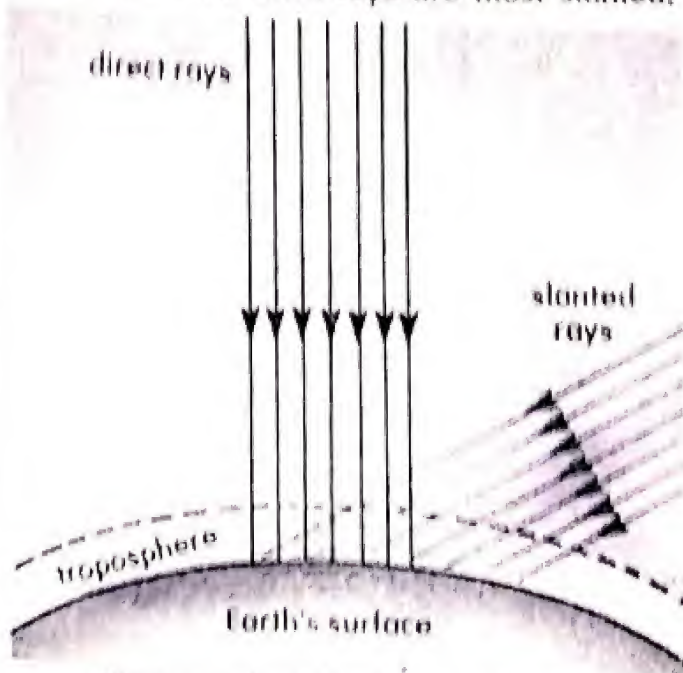


Weather satellite

800 km) above Earth. Communications satellites, which broadcast telephone conversations, radio and television signals, computer data, and other information, orbit at about 23,000 miles (37,000 km)."

"What makes one day hotter than another?" asked Ace.

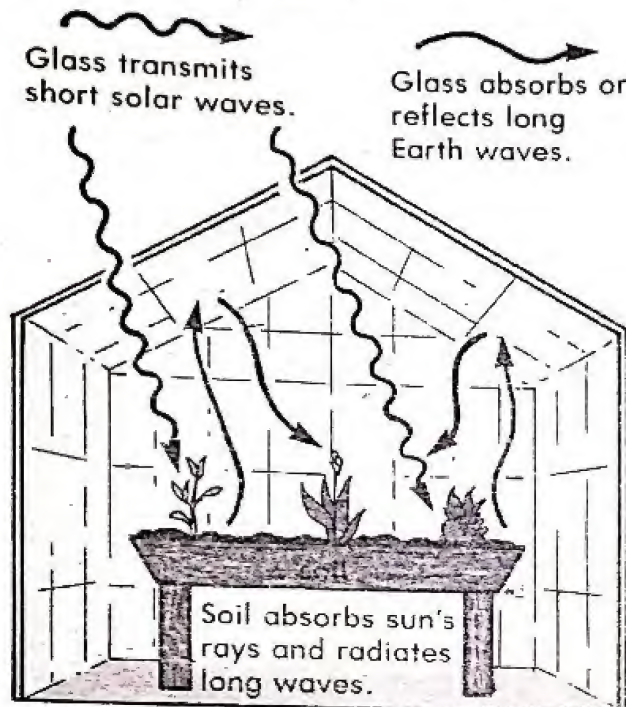
"Atmospheric temperature depends mostly upon the sun's radiation," Dad answered. "A very small amount of heat rises from the heated surface of Earth itself into the atmosphere, but most of the heat you feel comes directly from solar rays. The greatest heat comes to Earth from the sun when the sun's rays shine directly upon an area and no clouds block the sun's radiation. The least heat comes when the sun's rays are most slanted."



Direct and slanted radiation of the sun

"Heat from the sun enters the atmosphere as energetic radiation. As these rays from the sun plunge toward Earth's surface, many of them are absorbed by the magnetosphere, ionosphere, and ozone layer of the stratosphere. Clouds reflect many of these rays back into space, and more of the remaining rays are absorbed by the air on their way to the ground. Land and water absorb the rays that do reach the ground. Only about forty-five percent (45%) of the original energetic rays that enter the atmosphere make it to the ground. Energetic rays warm the air only a little. Earth, heated by the sun, then gives off less energetic rays that the air absorbs easily; so the air around us is mainly heated by reradiation."

"That reminds me of how a greenhouse works," said Ace. "The glass allows energetic radiation to penetrate into the greenhouse, but it prevents the less energetic radiation from escaping the greenhouse."



Radiation in a greenhouse

"Yes," Ace, in the same way, the layers of the upper atmosphere act like the glass of a greenhouse. They keep many less energetic rays from leaving the atmosphere."

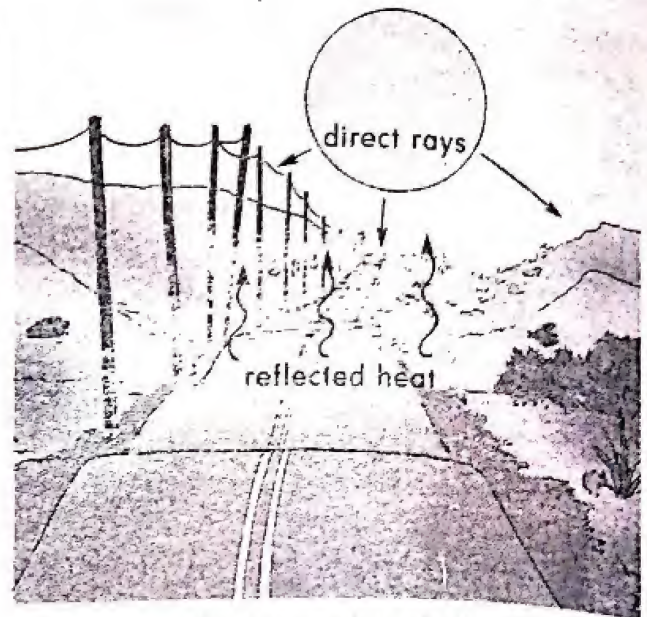
"I have noticed that a dark car top feels hotter to the touch than a white car top. This is especially true on a hot day," added Ace.

"You are correct, Ace. Dark colors absorb more heat than do light colors," agreed Dad.

"I also remember seeing heat waves shimmer over the blacktop road we were on last summer," continued Ace.

"Heat waves over the blacktop were caused by a combination of the sun's direct rays and the reflected heat from the road's surface," said Dad. "The wavy air causes the shapes behind the wavy air to appear blurred because the wavy air also bends light rays."

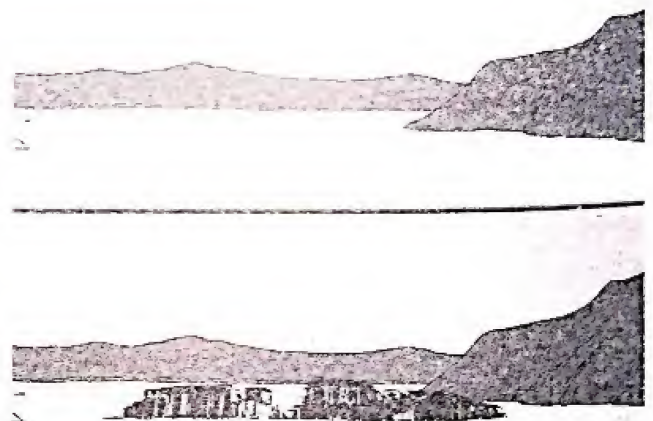
"The heat waves deceived me, Dad. When I looked at a distant spot on the blacktop road, I thought I saw a puddle of water, but when



Heat waves blur shapes

we approached the spot, the puddle disappeared. You told me I saw a mirage just like the ones men sometimes see when crossing the desert. You said the heat waves caused the mirage."

"That's right, Ace. Light rays bend upward as they approach the warmer air near the ground. This upward bending of light rays makes Earth's surface act like a mirror. This 'mirror' reflects images of the sky or objects on the other side of the mirage, causing the mirage to look like a shimmering lake or puddle of water that really isn't there."



Mirage

B. Humidity

"Dad, you said that the weather seems hot today partly because the humidity is high," commented Ace. "What does humidity have to do with the temperature?"

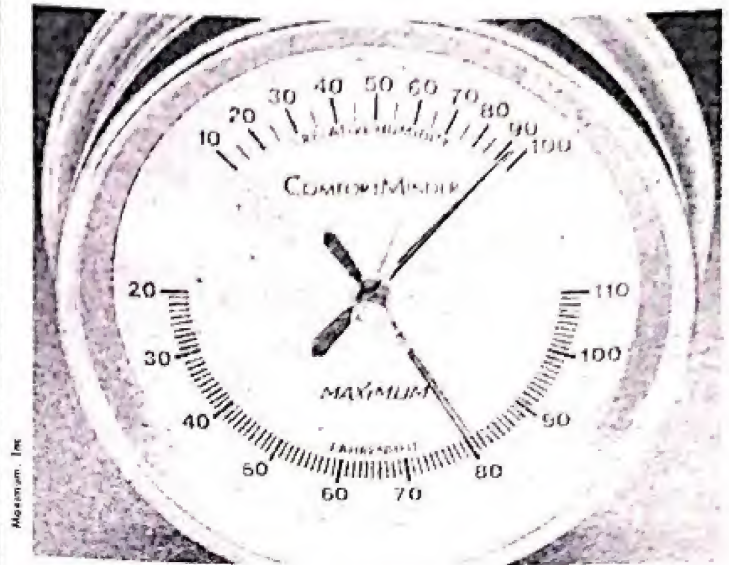
"Well, Ace, God designed our bodies to produce perspiration on hot days," explained Dad. "When the perspiration evaporates from our skin, heat is absorbed, and we feel cooler. Humidity is the water vapor content of air. When the humidity is high, the perspiration on your skin does not evaporate as readily, so you feel hotter."

"Meteorologists may report humidity as 'specific humidity' or 'relative humidity.' Specific humidity indicates the exact amount of water vapor in a given volume of air. Relative humidity indicates the percent of water vapor actually in the air compared to the greatest amount the air could hold at that temperature. Relative humidity of 100 percent would indicate that the air has all the water vapor in it that it can possibly hold. This is called saturation. Perfectly dry air would be 0 percent. Relative humidity is stated as some amount from 0 to 100 percent."

"Here, let's check the humidity level on the hygrometer. 'Hygro' (hī'grə) is a Greek root word meaning 'wet.' A hygrometer measures the amount of moisture in the air. Let's see—our hygrometer reads seventy-six percent (76%) relative humidity, which is quite high. We are more comfortable when the relative humidity is around forty to fifty percent (40 to 50%)."

"How is the hygrometer able to measure the humidity in the air?" asked Ace.

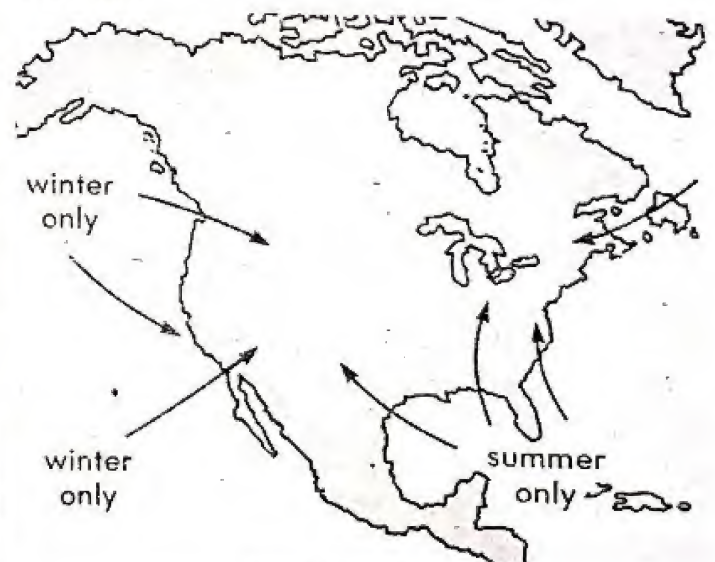
"Well, a hygrometer depends upon a material that responds to wetness," Dad answered. "Many hygrometers use either human hair or animal hair because hair increases in length as it absorbs water and decreases in length as it dries. As hair changes its length, a needle moves on a dial. Measurement of humidity by hair length is called 'hair hygrometry.'"



Hair hygrometer

"Why does the humidity change from day to day?" asked Ace. "I would think that it would be about the same every day."

"Humidity, or the amount of water vapor in the air, depends upon many different things," replied Dad. "Air is more humid near large bodies of water, like oceans, but is usually very low in humidity in desert areas. Winds bring humid air from the oceans over large portions of the country. Our atmosphere in Highland is very humid today because we have received moist air from the ocean southeast of here. A north or west wind usually brings us drier air."



Winds from oceans

"Humidity in desert areas, like the state of Arizona, may be as low as two percent for

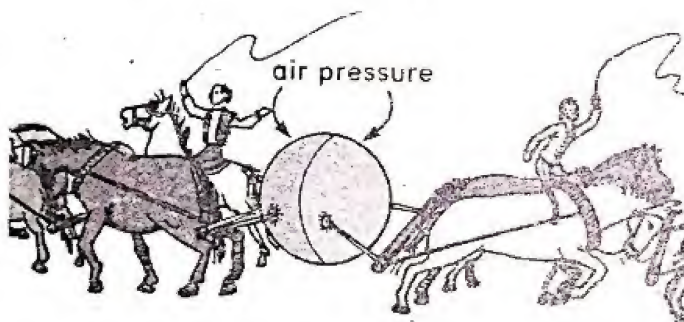
much of the year, while southern Louisiana's humidity may be as high as eighty percent much of the year. Humidity is stated as some amount between 0 and 100 percent."

C. Pressure

"What is the other gauge on the side of the garage, Dad?" asked Ace.

"That is a barometer; it measures the amount of pressure with which the air is pushing down on Earth," explained Dad.

"Atmospheric pressure is a tremendous force. Many years ago, atmospheric pressure was not understood and seemed to play many puzzling tricks. In 1650 the mayor of a certain German town enjoyed experimenting with science. This mayor joined the rims of two large, hollow, steel hemispheres together and pumped out the inside air, creating a vacuum. Eight horses were then used to pull on each of the two steel hemispheres, but nothing happened. The hollow steel ball held tightly together."



The mayor's steel ball sticks tightly together.

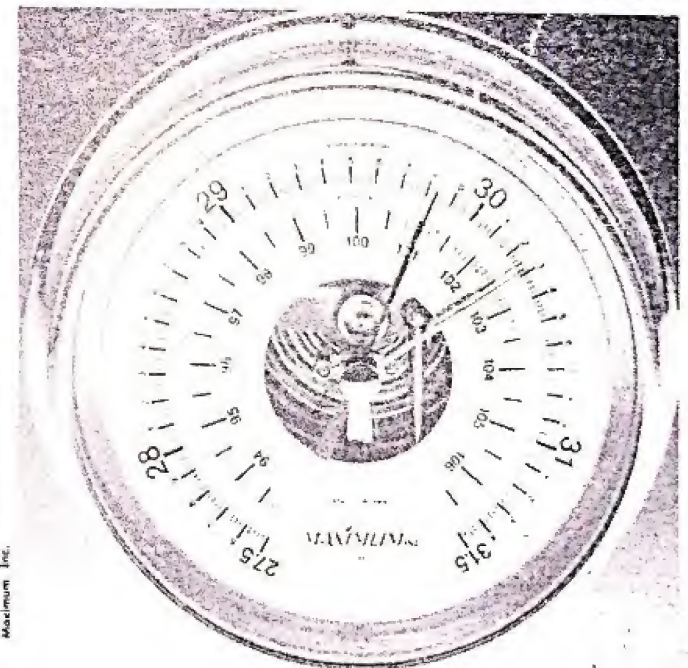
"Then, the mayor made an opening in the ball, and the two halves easily fell apart. What had happened? The secret was that the atmospheric pressure pushing on the outside of the empty ball was a much greater force than sixteen horses could overcome. When air was allowed to enter the empty ball, the atmospheric pressure on both sides became equal,

allowing the hemispheres to fall apart by themselves.

"Atmospheric pressure is also a tremendous force in every breath you take. Just as air rushes into every opening on Earth the instant it is permitted to do so, air rushes in to fill your lungs as your chest muscles and diaphragm enlarge the chest cavity, making more room inside your chest. As your lungs expand, they fill with air and allow you to breathe in needed oxygen.

"Because even slight changes in atmospheric pressure greatly affect our weather, atmospheric pressure is measured by a barometer every moment of every day at the national weather stations in various areas of the country so that meteorologists can predict rain and storms. The arrival of stormy weather is associated with low atmospheric pressure, while the arrival of fair weather is associated with high pressure.

"One common type of barometer, like this one on our garage, contains no liquids. This dry barometer is called an aneroid barometer; it shows changes in pressure upon the two sides of a small metal container. Changes in atmospheric pressure move a needle on a dial. Many small barometers are of the aneroid



Aneroid barometer

type. However, the mercury barometer is the type used at national weather stations.

"The Italian experimenter, Evangelista Torricelli (e'văn-jē-lē'stā tōr'rē-chēl'lē), invented the mercury barometer in 1643," continued Dad. "Mr. Torricelli placed a tube full of mercury upside down into a dish of mercury. The tube, more than 32 inches (81 cm) long, remained filled to about 30 inches (76 cm) of mercury because the atmospheric pressure pressing down on the mercury in the dish held the mercury in the tube that high. Mr. Torricelli found that at sea level the atmospheric pressure always held the mercury in his tube about 30 inches above the level of the mercury in the dish. In other



Torricelli placing tube in dish of mercury

words, a 30-inch column of mercury exerts as much pressure as a column of air, that extends to the top of the atmosphere!"

Mr. Virtueson and Ace went into the kitchen to get a drink of water. As they were drinking, Mr. Virtueson said, "Ace, would you please bring me a pair of scissors?"

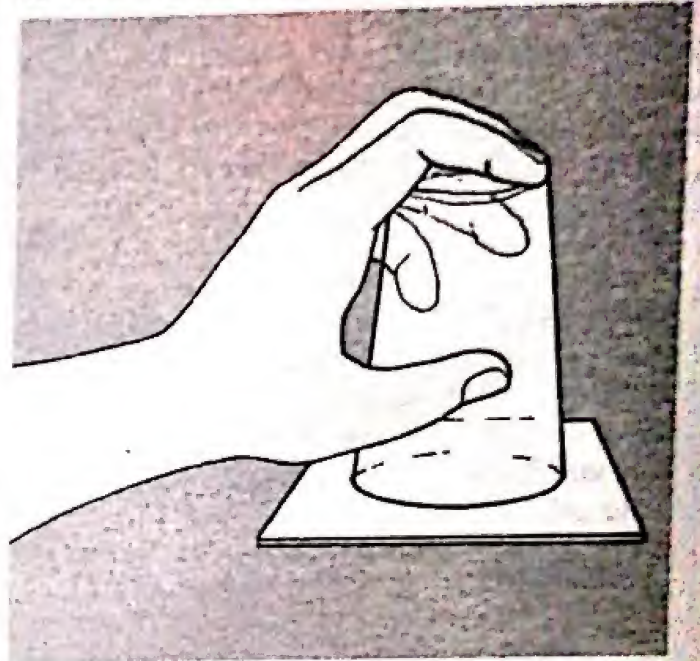
"Certainly, Dad," Ace replied.

When Ace returned to the kitchen, he found Mr. Virtueson seated at the table with a cardboard box placed in front of him. "Thank

you, Ace," Dad said, as he took the scissors and cut out a small cardboard square.

"Now, let's fill a glass with water," said Dad. Ace filled the glass and Mr. Virtueson handed him the square of cardboard. "Cover the top of the glass with the cardboard square. Then turn the glass upside down."

Ace covered the mouth of the glass. Then he very carefully turned the glass upside down as he held the cardboard firmly in place.



Air pressure holding cardboard in place

Mr. Virtueson surprised Ace by saying, "Now, let go of the cardboard!"

Ace slowly removed his hand. The cardboard stayed in place! "Why doesn't the water spill?" he asked.

"The air pressure pushing up against the cardboard is strong enough to hold the cardboard in place even when the glassful of water is pressing down upon it," Dad answered.

"Mr. Torricelli showed by scientific experimentation that air has weight when he made the first barometer. Thousands of years before that, however, the Scripture described air as having weight when it stated that God made 'the weight for the winds' (Job 28:25a).

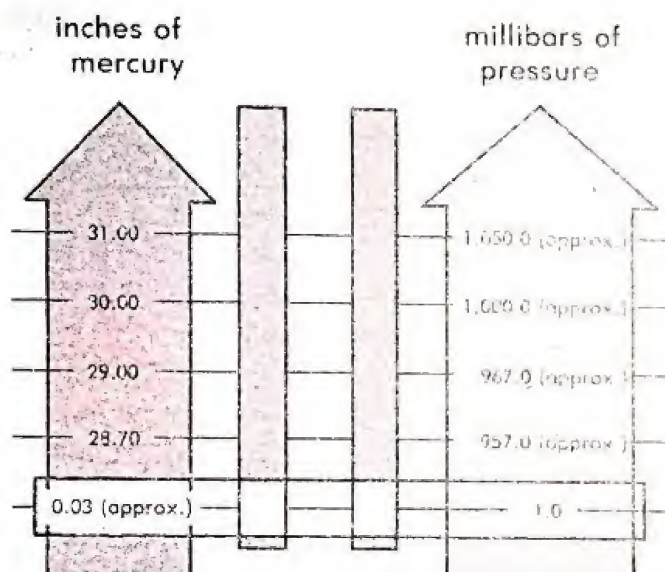
"Because mercury is very heavy, it is used to measure the weight of air. A one-square-inch

(6.45-cm²) column of mercury 30 inches (76 cm) high weighs about 14.7 pounds (6.7 kg). Since air pressure can hold 14.7 pounds of mercury up in a glass tube, we know that air presses down on every square inch of matter with 14.7 pounds of force at sea level. *Fig 24-31*

"Air pressure is a constant, nearly always 15 pounds per square inch, or 1,000 millibars, at sea level," Dad added. "Constants in nature remind us of the changeless character of God. The Bible states in Malachi 3:6a, 'For I am the LORD, I change not.' We can always depend on God's love, mercy, and grace."

"Dad, what system of measurement is used to measure atmospheric pressure?" Ace asked. "Air pressure is really a powerful force."

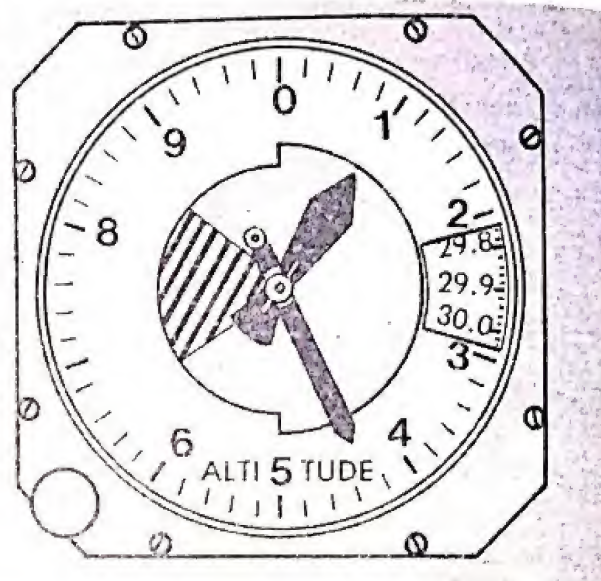
"Atmospheric pressure is measured in either inches or millibars (mb) of mercury on the barometer. U.S. scientists and meteorologists use inches, while meteorologists in other countries use millibars," explained Dad. "About 0.03 inch of mercury equals one millibar. Thirty inches is equal to about 1,000 millibars."



Two scales of barometric pressure

"Low pressure is any barometric reading below 30 inches (1,000 mb) at sea level, so that 29 inches (967 mb) is very low pressure, and 28.7 inches (957 mb) is extremely low. Extremely low pressure readings have been associated with very destructive storms.

"Barometric pressure at sea level is 30 inches (1,000 mb) of mercury. As you ascend from sea level, the atmospheric pressure becomes less and less. For every 900 feet (300 m) above sea level, the air pressure drops by about one inch of mercury (33 mb). Altitude can be determined by watching a barometer as you ascend. Some dry barometers are marked off in feet (m) so that the barometer also becomes an instrument called an 'altimeter,' which measures height."



Altimeter in plane

"One of my friends told me that when he and his family camped in Colorado at 8,000 feet (2,400 m) above sea level, their water boiled at a temperature lower than 212° F (100° C)," said Ace.

"That's true," said Dad, "because the boiling point of any liquid is the temperature at which the liquid bubbles and changes from a liquid to a gas. The boiling point of any substance depends on atmospheric pressure."

"Why is that true, Dad?" asked Ace.

"As a liquid absorbs heat, its molecules gain energy and become more active," answered Dad. "In fact, one scientific definition measures temperature by the rate at which molecules are in motion. The increased movement of the molecules enables them to rise above the liquid's surface. When this happens, the liquid starts to boil. When a

liquid boils, the molecules move farther apart, causing the substance to change from a liquid to a gas.

"You already know that the atmosphere has weight. Atmospheric pressure pushes down on the surface of a liquid. When molecules gain enough heat energy to overcome the weight of the atmosphere, they rise above the surface."

"So the liquid boils, Dad, but how does the air pressure affect the boiling temperature of liquids?" asked Ace.

"Just suppose the air pressure on a liquid's surface is diminished, Ace. How do you think that would affect the boiling liquid?"

"The liquid would boil at a lower temperature when the air pressure is diminished," replied Ace. "However, I'm not sure why."

"Well," Dad answered, "when air pressure is diminished, the molecules of a liquid need less energy to rise above the surface. If the molecules need less energy to escape, they escape at a lower temperature."

"As you know, atmospheric pressure diminishes as altitude increases. If your friend and his family continued their climb in the mountains up to 10,000 feet (3,000 m), they would find that water would boil at 162° F (72° C) because of the lowered air pressure."

"Not only does water boil at lower temperatures in higher altitudes, but lamps that use pressurized gas for fuel also do not burn as brightly at high altitudes. The lower atmospheric pressure causes them to burn less brightly."

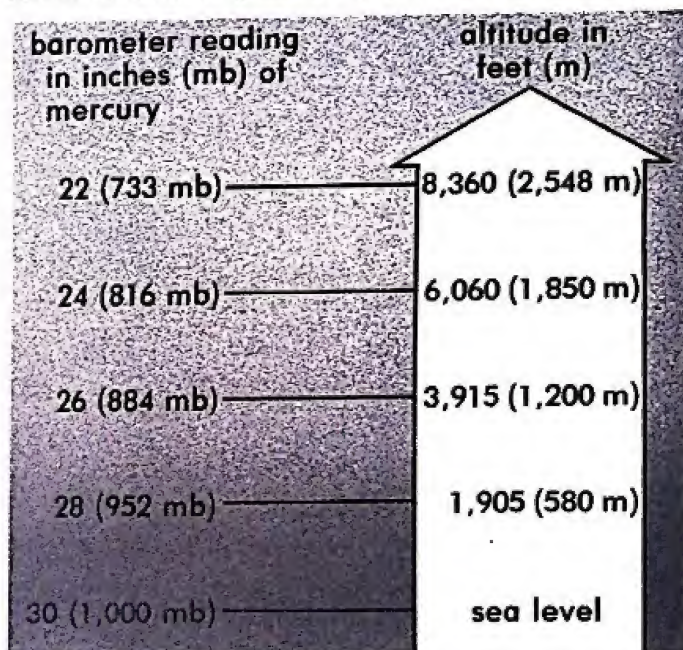
"Bill said that air is less concentrated at the top of a mountain," Ace related. "Does that mean that air pressure is less there?"

"Yes, it does," replied Dad. "Mr. Torricelli predicted that the mercury level in his tube would be lower on the top of a mountain than in a valley. He believed that on the mountain-top less air pressure would be needed to balance the weight of mercury in the tube."

"Mr. Blaise Pascal (blēz pās'kel), a French scientist, heard reports of Mr. Torricelli's work and tried a similar experiment, using a glass

tube 34 feet (10 m) high, filled with water, to check Mr. Torricelli's ideas. Mr. Pascal placed the glass tube in a tub of water and found that the weight of the atmosphere on the surface of the water in the tub balanced a column of water in the long tube. He also found that a vacuum formed between the top of the column of water and the top of the glass tube—just as Mr. Torricelli had found with his tube of mercury.

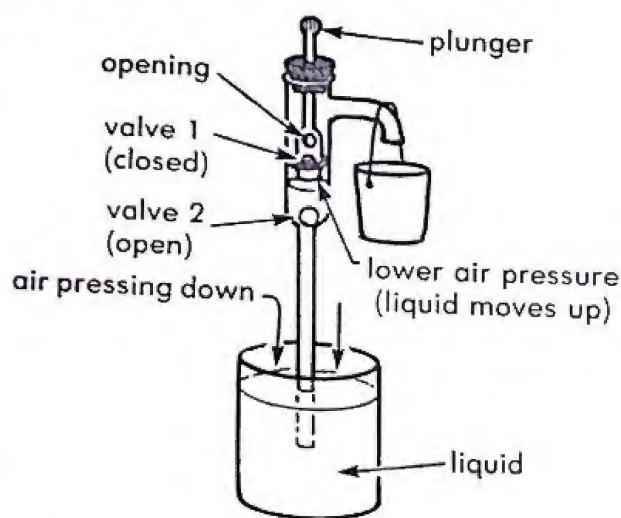
"Encouraged by these findings, Mr. Pascal had his brother-in-law, Florin Périer (flō'rān' pē-rē-ā'), take a mercury barometer to the top of a local mountain, the Puy-de-Dome (pwē-də-dōm'). On the mountaintop Mr. Périer noticed that the mercury level in his tube fell, while a barometer left in Mr. Pascal's town of Rouen (rōō'än') showed no change in



Comparing altitude and air pressure height during the day. This experiment in 1646 showed that the height of a mercury column does indeed vary with the amount of air above it."

"Dad, you said that atmospheric pressure caused the water in the tube Mr. Pascal used for his experiment to be over 30 feet (9 m) high. Does the pressure pushing on the surface of the water in a well cause a pump to work?" asked Ace.

"Yes, Ace," replied Dad. "A suction pump works by removing air in a pipe above the water's surface. The weight of the air surrounding the pipe continues to press down on the surface of the water surrounding the pipe. Since no weight presses down on the water in the pipe, that water will rise in the pipe. The pump only appears to 'pull' the water up the pipe. Actually, the weight of the air on the well water 'pushes' the water into and up the pipe when air pressure is absent at the top of the pipe."



Suction pump

"Dad, I can think of a way that I like for atmospheric pressure to work for me," said Ace.

"What way is that?" asked Dad.

"When I use a straw to drink milk from a glass, atmospheric pressure works for me. From what you have told me, I would say that the liquid moves up the straw because I remove air from inside the straw. The air pressure on the surface of the milk in the glass pushes the milk up the straw and into my mouth," answered Ace.

"You are correct, Ace. Drinking with a straw uses the same laws by which a suction pump operates, only on a smaller scale," continued Dad.



How a straw works

"Dad, learning how to measure pressure and temperature has been very interesting, but why have so many people in history spent so much time and money to learn how to read atmospheric conditions accurately?" Ace asked.

"That's a good question, Ace," answered Dad. "The more we know about atmospheric conditions, the better we can predict weather conditions for the next few days. People in coastal areas need to know as accurately as possible, if and when a destructive storm will arrive in their area. Many lives were lost in unexpected storms before we learned how to read weather conditions. Farmers also need to know whether to expect rain so that they can plan their planting and harvesting times.

"God is able to use weather to teach us to be flexible. No matter what plans you may have, you must cancel them in case of violent weather, such as a hurricane, or harsh winter weather, such as deep snow. When we must change our plans because of the weather, we learn which things are important and which are not. A violent storm could, at any time, destroy our home and everything in it. Therefore, God tells us in Colossians 3:2, 'Set your affection on things above, not on things on the earth.'"

"That is a good idea, Dad," said Ace. "I'll try to remember to be flexible whenever God wants to change things that affect me, whether He uses the weather or people."

End of Section Three

Now turn to your Activity Pac and work the activities as directed, while rereading the related PACE text.



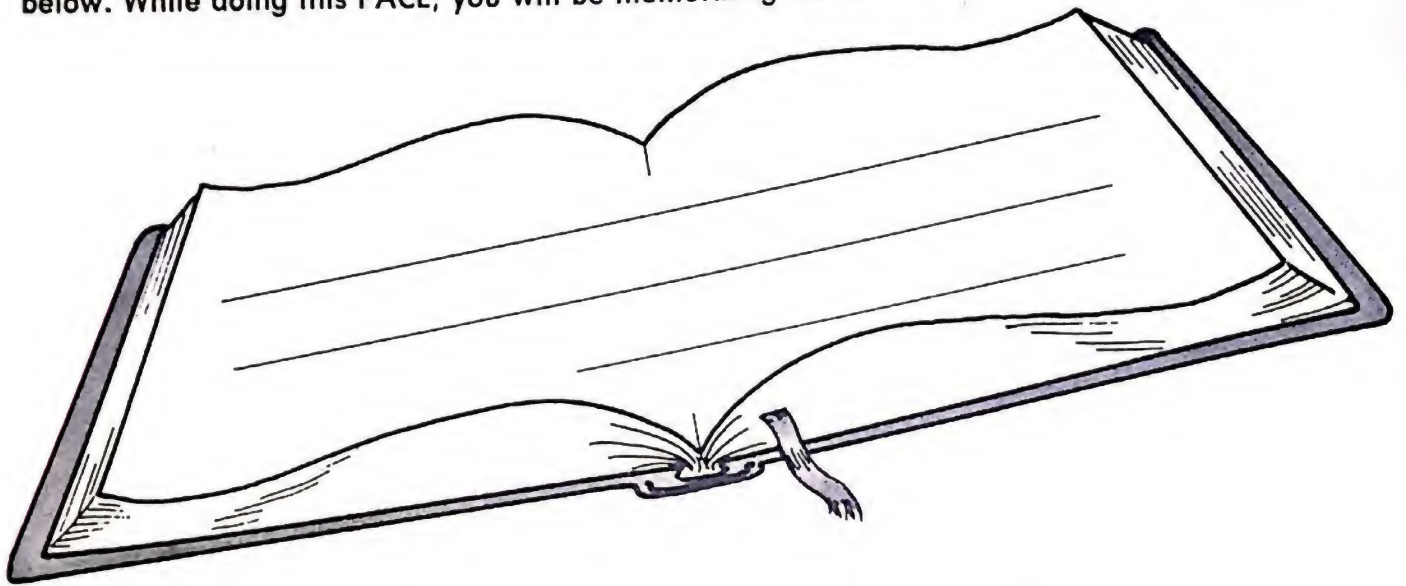
b1 p.1-3

My Goals

- To review the simple tenses of verbs
- To learn to form the perfect tenses of verbs
- To learn to write the six tenses of a verb in one person
- To learn how verbs show continuing action
- To learn how verbs show emphasis
- To learn to use troublesome verbs correctly
- To learn to be true to God and others because of a promise, love, or honor—to be faithful



Find I Corinthians 4:2 in your Bible. Correctly write the verse and reference in the Bible picture below. While doing this PACE, you will be memorizing this verse.



Faithful



Symbol and Sound Chart

ā = glad	ī = sit	ōō = tool	oi = coin	zh = Asia
ā = save	ī = kind	ū = cup	ou = out	e = <u>a</u> in above
ā = fair	ō = box	ū = use	sh = she	e = <u>e</u> in the
ā = barn	ō = go	ch = much	th = this, thin	e = <u>i</u> in easily
ē = best	ō = soft, order	kw = queen	ūr = burn	e = <u>o</u> in lemon
ē = bee	ōō = look	ng = song	z = has	e = <u>u</u> in Jesus

Fill in each blank, using the verb and the tense indicated in parentheses at the end of each sentence.

Success or Failure?

- (1) The peanut crops before 1914 _____ bountiful. (be, past perfect)
- (2) However, the farmers soon _____ too many peanuts. (have, past)
- (3) Mr. Carver _____ not _____ this problem. (consider, past perfect)
- (4) It _____ not _____ God by surprise, however. (take, present perfect)
- (5) He _____ a new project for Mr. Carver. (have, present)
- (6) The scientist _____ himself in his laboratory. (lock, present perfect)
- (7) He _____ God for wisdom concerning the peanut. (ask, present)
- (8) In six days God _____ the mysteries of the peanut to Mr. Carver. (reveal, future perfect)
- (9) Soon, Mr. Carver _____, from the peanut, such things as flour, dyes, and shoe polish. (produce, present perfect)
- (10) By the end of his life, he _____ over three hundred ways to use this lowly legume. (find, future perfect)
- (11) Now, the farmers _____ a market for their crop. (have, future)
- (12) In addition, the demand _____ rise to new industries. (give, future perfect)
- (13) Next, Mr. Carver _____ with the sweet potato. (experiment, future)
- (14) What fun he and the Lord _____! (have, past)
- (15) God _____ treasures in the sweet potato, too. (wrap, past perfect)
- (16) Mr. Carver simply _____ those treasures. (discover, past)
- (17) What more _____ in store for this faithful servant? (be, present)
- (18) We _____ soon _____. (see, future)

Find I Corinthians 4:2 in your Bible. While reading it three times, continue memorizing it.

Checkup

My score _____

Underline the correct answer in each sentence.

(3 points each)

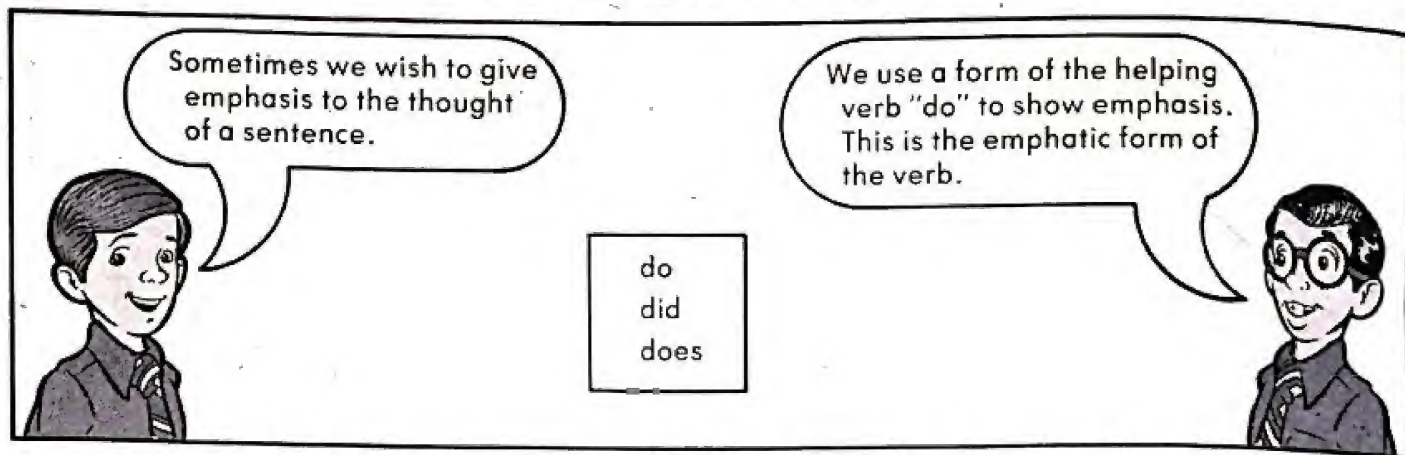
- (1) The (principal, participle, practical) parts of a verb are used to form the six tenses and to show progressive time.
- (2) The three (simple, perfect, past) tenses are present, past, and future.
- (3) The three (simple, perfect, past) tenses are present perfect, past perfect, and future perfect.
- (4) The present tense and future tense are formed from the (present, past, past participle) form of the verb.
- (5) The past tense is formed from the (present, past, past participle) form of the verb.
- (6) The perfect tenses are formed from the (present, past, past participle) form of the verb.
- (7) "Have" and "has" are the helping verbs for the (present, past, future) perfect tense.
- (8) "Shall have" and "will have" are the helping verbs for the (present, past, future) perfect tense.
- (9) "Had" is the helping verb for the (present, past, future) perfect tense.

Fill in each blank, using the verb and the tense indicated in parentheses at the end of each sentence.

- (10) At last, little George Washington Carver _____ school. (attend, future)
- (11) Having no money, he _____ in a farmer's barn. (sleep, present)
- (12) Later, the kind farmer _____ George a better place to sleep. (give, past)
- (13) George Washington Carver _____ always _____ learning. (enjoy, present perfect)
- (14) Soon, as stated in Psalm 119:99, God _____ him more understanding than all his teachers. (give, future perfect)
- (15) At age twenty-one, Mr. Carver _____ from high school. (graduate, past perfect)
- (16) Although accepted, he _____ unable to enroll in a Kansas university. (be, future)
- (17) Only with God's help, _____ George _____ comfort during his disappointment. (find, future perfect)
- (18) Finally, his long, hard struggle to attend a university _____ profitable. (prove, past)

Please continue on the next page.

Using Helping Verbs for Emphasis



Draw two lines under the verb in each sentence.

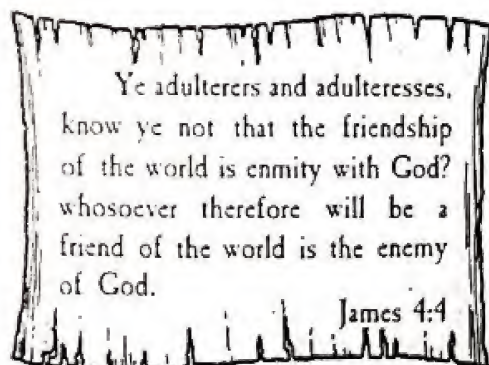
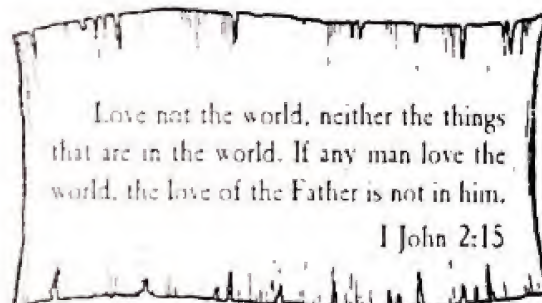
Study these examples.

Do you understand more about the fear of the Lord now?

Fearing the Lord does mean hating all evil.

What Is the Fear of the Lord? (continued)

- (1) I did ask myself some questions.
- (2) Do I hate every false way?
- (3) Do I consider the wastefulness of vain thoughts?
- (4) Does lying disturb me?
- (5) Do I abhor the work of evil men?
- (6) The Lord does not want me to live like the world.
- (7) I do remember the command of I John 2:15.
- (8) In this verse, does God merely suggest something?
- (9) No! He does command me not to love the world.
- (10) A friend of the world does soon become an enemy of God.
- (11) How do I learn to hate evil?
- (12) The Word of God does hold the key.
- (13) From the Bible, I do gain the knowledge of God.
- (14) God's Word does reveal His character and nature.
- (15) I do want to read the Bible and become more like God.
- (16) By hating evil, I do begin to learn the fear of the Lord.
- (17) By fearing the Lord, I do gain wisdom.
- (18) Each verb you underlined has the _____ form and shows _____.



Checkup

My score _____
(2½ points each)

Underline the correct answer in each sentence.

- (1) We never use a helping verb with the (present, past, participle) form of the verb.
- (2) We use forms of "be" with the present participle for the (progressive, emphatic, passive) form of a verb.
- (3) We use forms of "be" with the past participle to indicate that the verb has (active, passive, tense) voice.
- (4) We use the forms of "do" for the (progressive, emphatic, passive) form of a verb.

Fill in all six tenses of each verb in the person indicated.

have	having	had	had
(5) I _____ present			
(6) I _____ past			
(7) I _____ future			
(8) I _____ present perfect			
(9) I _____ past perfect			
(10) I _____ had future perfect			
realize	realizing	realized	realized
(11) he _____ present			
(12) he _____ past			
(13) he _____ future			
(14) he _____ present perfect			
(15) he _____ past perfect			
(16) he _____ realized future perfect			

Draw two lines under the verb in each sentence.

- (17) Christi is growing in wisdom, practicing the character traits.
- (18) She has been seeking an opportunity to present Bible stories to children.
- (19) One day, Christi was sharing with Miss Content this desire to serve Christ.
- (20) At the same time, Miss Content had been thinking about young, squirming "A B C students."
- (21) Miss Content has been praying for new ways to capture the children's attention.
- (22) Soon, Christi will be presenting her illustrated Bible story to the A B C group.
- (23) By now, she will have been finishing the last details of her preparation.
- (24) The children are eagerly awaiting Christi's visit.
- (25) Christi's Bible story will be blessing the children, Miss Content, and Christi herself.
- (26) Each verb you underlined in (17)-(25) is in the (progressive, emphatic) form.



Faithful in Many Things

One evening at a special congregational meeting, Pastor Alltruth begins, "I want to thank everyone for coming to this special meeting. The first item we should consider is building plans."

Mr. McMercy stands quickly. "Pastor," he says, "I know an architect who will draw the blueprints exactly as we want them, and he has offered to contribute his time."

"Wonderful!" exclaims Pastor Alltruth.

Mr. McMercy continues, "Also, I would like to volunteer to be the contractor for the building."

"Thank you, Mr. McMercy," replies Pastor Alltruth. "Thank you very much."

Mr. Loylton adds as he stands, "Pastor, since I am a surveyor, I volunteer to do the surveying and take the necessary soil samples."

All the deacons stand up together. "Pastor," one deacon says, "we want you to know that we and our wives are willing to work on the building and do anything you want us to do."

"This is just wonderful!" Pastor Alltruth exclaims joyfully. "You are all such faithful people. Your promises and love are a blessing. Let us continue to be faithful stewards. Who knows what blessings the Lord has in store for us?"

Thinking about what happened in our story, read Proverbs 28:20a. Keeping in mind the principles of Proverbs 28:20a, answer these questions.

- (1) Have Pastor Alltruth and the people of Highland Church been faithful? _____
- (2) In light of Proverbs 28:20a, can they expect God's blessings? _____
- (3) In Old French the word "abound" means "to overflow." Should they expect few or many blessings? _____
- (4) Is it wise to be faithful? _____
- (5) What does God give the wise man as a reward for being faithful? _____

Now apply the wisdom of Proverbs 28:20a to yourself by writing "I" in each blank.

- (6) _____ shall be faithful, and _____ shall abound with blessings.

Write "c" if the underlined form of the verb is used correctly. Write "i" if the underlined form of the verb is used incorrectly. There are eight verb forms used incorrectly.

- | | |
|--|--|
| <p>_____ (1) Racer, please <u>sit</u> the clock.</p> <p>_____ (2) Fresh, sparkling snow was <u>laying</u> on the mountain.</p> <p>_____ (3) Overnight the water level <u>raised</u> considerably.</p> <p>_____ (4) Becky accidentally <u>sat</u> on the man's hat.</p> <p>_____ (5) He slowly <u>rose</u> the flag on the pole.</p> <p>_____ (6) You may <u>lay</u> your coats here.</p> <p>_____ (7) Please, <u>let</u> me go, too.</p> <p>_____ (8) <u>Teach</u> me a Bible verse, please.</p> <p>_____ (9) <u>Lay</u> your books on the desk.</p> <p>_____ (10) We <u>sat</u> the hen so that the eggs would hatch.</p> | <p>_____ (11) Gideon <u>set</u> out a fleece.</p> <p>_____ (12) Which hen has <u>laid</u> the most eggs?</p> <p>_____ (13) Mr. Virtueson often <u>sets</u> on the platform.</p> <p>_____ (14) <u>Raise</u> your hand before answering.</p> <p>_____ (15) Does Judson <u>lay</u> on his stomach?</p> <p>_____ (16) I have <u>sat</u> here thirty minutes.</p> <p>_____ (17) Everyone <u>rises</u> to salute the flag.</p> <p>_____ (18) Did you <u>let</u> your muddy shoes outside?</p> <p>_____ (19) Dusty may <u>lie</u> on the porch.</p> <p>_____ (20) At the rapture the dead in Christ will <u>rise</u> first.</p> |
|--|--|

Look at the incorrect sentences above. On the lines below, write each sentence correctly, keeping the same tense of the verb.

- (21) _____
- (22) _____
- (23) _____
- (24) _____
- (25) _____
- (26) _____
- (27) _____
- (28) _____

Write I Corinthians 4:2 two times on a separate sheet of paper.

Score pages
36 and 37.

Correct mistakes.

Rescore.

Checkup

My score _____
(2½ points each)

Use the words below to fill in the blanks correctly.

lie	set	rise	sit	lay	raise
-----	-----	------	-----	-----	-------

These verbs usually take a direct object:

- (1) _____ (2) _____ (3) _____

These verbs never take a direct object:

- (4) _____ (5) _____ (6) _____

Match each word with its definition.

- | | |
|------------------|---|
| _____ (7) let | (A) to gain knowledge |
| _____ (8) leave | (B) to go away from; to let stay |
| _____ (9) learn | (C) to give knowledge |
| _____ (10) teach | (D) to allow |
| | |
| _____ (11) set | (E) to put or place something; to put in some condition |
| _____ (12) sit | (F) to put or place; to produce an egg |
| _____ (13) lay | (G) to be seated; to rest |
| _____ (14) lie | (H) to lift up; to grow |
| _____ (15) rise | (I) to go up; to get up |
| _____ (16) raise | (J) to rest or recline |

Write "c" if the underlined form of the verb is used correctly. Write "i" if the underlined form of the verb is used incorrectly. There are four verb forms used incorrectly.

- | | |
|--|---|
| _____ (17) Did someone <u>leave</u> the gate open? | _____ (21) Pudge <u>raises</u> early. |
| _____ (18) Ace will <u>learn</u> the twins to talk. | _____ (22) Miriam <u>sat</u> the table. |
| _____ (19) Christi <u>set</u> listening to the missionary. | _____ (23) Gideon <u>laid</u> out a fleece. |
| _____ (20) Let's <u>lay</u> up treasures in Heaven. | _____ (24) This PACE <u>teaches</u> us about verbs. |

Please continue on the next page.

My Goals

To learn these spelling words:

hoe	mold
clog	squash
hoarse	host
core	smog
rot	lodge
role	honest
wore	honk
roam	roast
zone	spore
pose	oath
source	solve
boast	

dependable	reliable
curable	perceptible
advisable	reversible
serviceable	deniable
traceable	permissible
changeable	resistible
valuable	terrible
manageable	collapsible
conformable	collectible
profitable	livable
noticeable	convertible
sensible	

volume	justifiable
responsible	usable
pillow	corps
society	favorable
solemn	accessible
probably	legible
possession	credible
poultry	
prominent	
opportunity	
pollen	
novel	

To learn the ō and ǒ sound spellings

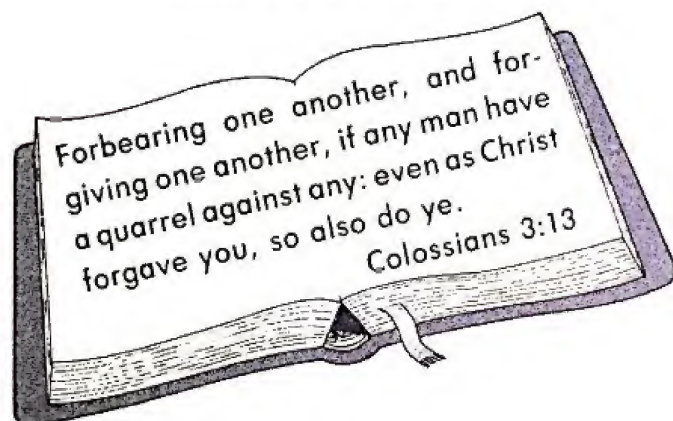
To learn rules for adding suffixes

To learn to form adjectives from verbs by adding the suffixes -able and -ible

To learn to spell some words that are often misspelled

To learn to love others and overlook their mistakes—to be forgiving (See page 15.)

Learn this Scripture Verse



Symbol and Sound Chart

ă = glad
ā = save
â = fair
ā = barn
ē = best
ē = bee

ī = sit
ī = kind
ō = box
ō = go
ō = soft, order
ōō = look

ōō = tool
ū = cup
ū = use
ch = much
kw = queen
ng = song

oi = coin
ou = out
sh = she
th = this, thin
ûr = burn
z = has

zh = Asia
ē = ā in above
ē = ē in the
ē = ī in easily
ē = ō in lemon
ē = ū in Jesus



As illustrated by our spelling words, the o sound can be spelled o, oa, ou, or oe.



The o sound can also be spelled ow or ew.

grow
sew

This wise saying illustrates all the spellings of the o sound.



From Lydia who sewed clothes and David who defeated his boasting foe, we know God is the source of success.

From the information given above, fill in the blanks with the correct answers.

(1) The o sound can be spelled _____, _____, _____, _____, _____, or _____.

(2) Write and memorize the wise saying that illustrates the spellings of the o sound.

From pages 2, 3, 5, and 6, choose and write the spelling words that have the o sound.

(3) _____	(8) _____	(13) _____
_____	_____	_____
(4) _____	(9) _____	(14) _____
_____	_____	_____
(5) _____	(10) _____	(15) _____
_____	_____	_____
(6) _____	(11) _____	(16) _____
_____	_____	_____
(7) _____	(12) _____	(17) _____
_____	_____	_____

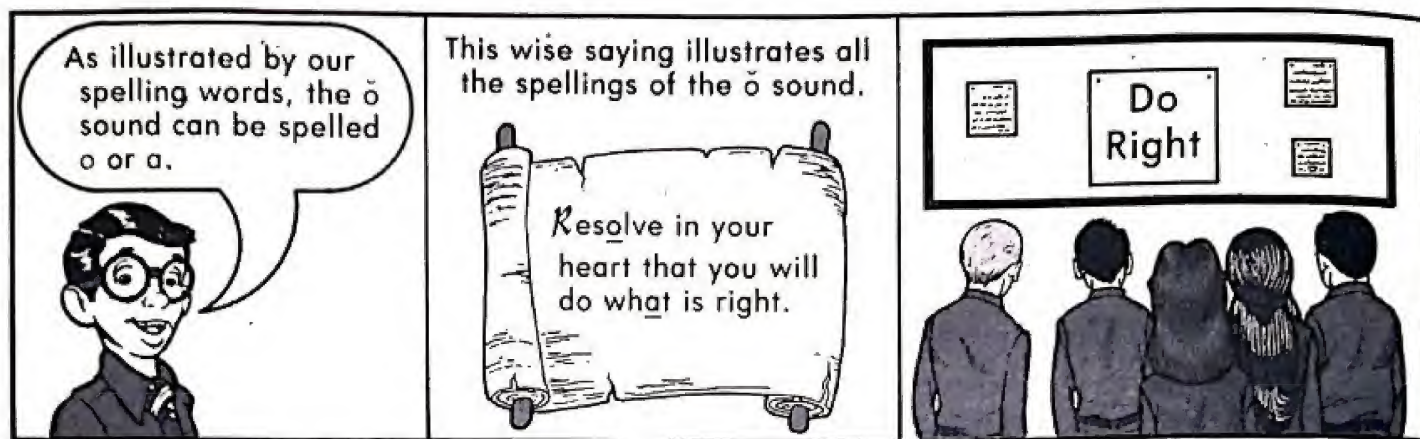
Find Colossians 3:13 in your Bible. On the lines below, complete the verse, including all punctuation and the reference. Be sure to spell all the words correctly.

(18) Forbearing one another, and _____

Score pages
7 and 8.

Correct mistakes.

Rescore.



From the information given above, fill in the blanks with the correct answers.

(1) The ð sound can be spelled _____ or _____

(2) Write and memorize the wise saying that illustrates the spellings of the ð sound.

From pages 2, 3, 5, and 6, choose and write the spelling words that have the ð sound.

(3) _____

(4) _____

(5) _____

(6) _____

(7) _____

(8) _____

(9) _____

(10) _____

Complete the spelling words, putting in the correct spelling for the ð sound.

(11) s ____ lve

(12) cl ____ g

(13) h ____ nk

(14) l ____ dge

(15) r ____ t

(16) sm ____ g

(17) squ ____ sh

(18) h ____ nest

Complete the spelling words, putting in the correct spelling for the ð sound.

(19) h ____

(20) sp ____ re

(21) w ____ re

(22) ____ th

(23) s ____ rce

(24) m ____ ld

(25) h ____ st

(26) r ____ st

(27) r ____ le

(28) c ____ re

(29) b ____ st

(30) h ____ rse

(31) p ____ se

(32) z ____ ne

(33) r ____ m

Find Colossians 3:13 in your Bible. While reading it three times, begin memorizing it.

D5 p. 12
7 Tick Up

Underline the word or phrase that best completes the sentence.

- (1) If you are *hoarse*, you have trouble (a) thinking (b) speaking (c) hearing.
- (2) When a drain *clogs*, it is not (a) dry (b) open (c) connected.
- (3) Something (a) fresh (b) cold (c) old is most likely to *rot*.
- (4) An *honest* person will (a) tell the truth (b) hide the truth (c) deny the truth.
- (5) (a) Potatoes (b) Buffalo (c) Both of these are known to *roam*.
- (6) A *spore* might be found on (a) a fern (b) a boat (c) your face.
- (7) Which does not have a *core*? (a) an apple (b) the earth (c) a flame.
- (8) You might *solve* (a) a math problem (b) a mystery (c) both of these.
- (9) Mom uses a *squash* to (a) make supper (b) mop the floor (c) hang a picture.
- (10) You can easily *mold* (a) stone (b) clay (c) both of these.
- (11) Dad would use a *hoe* in (a) the garden (b) the laundry (c) fixing the car.
- (12) *Smog* is found in many (a) swamps (b) mountaintops (c) cities.
- (13) Becky would most likely *pose* (a) for a picture (b) for lunch (c) while sleeping.
- (14) (a) A witness (b) The President (c) Both of these must take an *oath*.
- (15) The *source* of a river would likely be found (a) at its mouth (b) in the mountains (c) neither of these.
- (16) A *role* may be (a) performed (b) eaten (c) hired.
- (17) A *lodge* might be built by a (a) beaver (b) a bat (c) either of these.
- (18) (a) Canadian geese (b) Car horns (c) Both of these *honk*.
- (19) The (a) meatcutter (b) barber (c) ship might cut a *roast*.
- (20) A *host* should (a) ignore (b) paint (c) entertain his guests.
- (21) The (a) equator (b) North Pole (c) South Pole would be in the tropical *zone*.
(You may check an atlas.)
- (22) Dad *wore* (a) a dress (b) a tie (c) either of these.
- (23) (a) Goliath (b) David (c) Paul the Apostle did *boast* of his strength.

Find Colossians 3:13 in your Bible. While reading it three times, continue memorizing it.

Score pages
9, 10, 11, and 12.

Correct mistakes.

Rescore.

Checkup

My score _____

On a separate sheet of paper, write each spelling word three times. Score the words very carefully. Each word must be spelled correctly all three times to score one point. (1 point each)

- | | | | | |
|------------|-----------|-------------|-------------|------------|
| (1) hoe | (6) role | (11) source | (16) smog | (20) roast |
| (2) clog | (7) wore | (12) boast | (17) lodge | (21) spore |
| (3) hoarse | (8) roam | (13) mold | (18) honest | (22) oath |
| (4) core | (9) zone | (14) squash | (19) honk | (23) solve |
| (5) rot | (10) pose | (15) host | | |

(24) Write the wise saying that illustrates the spellings of the ō sound.

(25) Write the wise saying that illustrates the spellings of the ǒ sound.

Underline the correct phonetic spelling of each spelling word in parentheses.

(3 points each)

- (26) It's hard to sing, of course, if your voice is (hōrs, hōrs).
- (27) "Ah-ha," said the worm. "Here's a (cōr, kōr) to explore."
- (28) Meat will soon (rōt, rōt) if left out where it's hot.
- (29) Is the mist in the bog, fog, or (smōg, smōug)?
- (30) For breakfast we had toast; tonight we'll have (rōast, rōst).
- (31) (Mōuld, Mōld), I am told, forms on bread that is old.
- (32) If the sheep (rōme, rōm), the shepherd will guide them home.
- (33) Many puddles we did dodge before we finally reached the (lōg, lōj).
- (34) Today Racer will (hōō, hō); tomorrow he will mow.



(2 points)

Say from memory as much of Colossians 3:13 as you can. Check yourself by looking up the verse in your Bible. Use your Bible to complete the verse on the lines below.

- (35) Forbearing one another, and _____
- _____
- _____

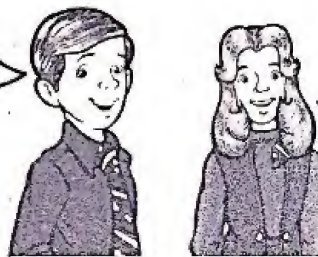
Forgiving



Read this story.

Have you ever broken something that belonged to another person? If you have, you know how Pudge felt when he broke Happy's flower pot. Of course, Happy was hurt to see this happen; however, he remembered that God had forgiven him of all sin. Remembering that helped him to forgive Pudge. When we forgive one who has offended us, we demonstrate Christian love.

Miss Martha once said something untrue about me. I forgave her, and now we are friends.



Becky forgot to return the pencil she borrowed from me. I forgave her and bought her a new pencil.

Think of three situations in which you demonstrated Christian love by overlooking the offense of another—that was being forgiving.

Tell about the situations. Be sure to use complete sentences. Watch your punctuation.

(1) _____

(2) _____

(3) _____

Complete each rule for adding suffixes that begin with vowels. (See page 22 for help.)

(1) Drop the final "e" unless the word ends in "_____" or "_____".

(2) If a word ends in "y," change the "_____" to "_____" before adding the suffix.



The following verbs do not follow the rules for forming adjectives.

From pages 16, 17, and 19, choose and write the spelling word that is the adjective formed from each of these verbs.

(3) terrify + ible = _____

(4) permit + ible = _____



Two of the spelling words in this section are adjectives formed from nouns.

A "percept" is something that can be grasped through the senses. "Advice" is a good suggestion.



Write the spelling words that are adjectives formed from the following nouns.

(5) percept + ible = _____

(6) advice + able = _____

Write these spelling words in alphabetical order.

curable
changeable

conformable
collapsible

collectible
convertible

dependable
deniable

(7) _____

(11) _____

(8) _____

(12) _____

(9) _____

(13) _____

(10) _____

(14) _____

Find these three Scripture verses in your Bible and read them; then underline the reference of the verse that teaches us to be forgiving.

(15) II Peter 3:10

Proverbs 22:15

Ephesians 4:2

Checkup

My score _____

On a separate sheet of paper, write each spelling word three times. Score the words very carefully. Each word must be spelled correctly all three times to score one point. (1 point each)

- | | | | | |
|-----------------|-----------------|------------------|------------------|------------------|
| (1) dependable | (6) changeable | (11) noticeable | (16) deniable | (20) collapsible |
| (2) curable | (7) valuable | (12) sensible | (17) permissible | (21) collectible |
| (3) advisable | (8) manageable | (13) reliable | (18) resistible | (22) livable |
| (4) serviceable | (9) conformable | (14) perceptible | (19) terrible | (23) convertible |
| (5) traceable | (10) profitable | (15) reversible | | |

Fill in the blanks with the correct answers for the rules for adding suffixes. (3 points each)

- (24) We can add the suffixes -able and -ible to many verbs and form _____
- (25) When adding a suffix beginning with a vowel, drop the final "e" unless the word ends in _____ or _____.
- (26) If a word ends in "y," change the "y" to _____ before adding the suffix.

Write the verb and suffix used to form each of these adjectives.

	<u>Verb</u>		<u>Suffix</u>		<u>Spelling Word</u>
(27)	_____	+	_____	=	sensible
(28)	_____	+	_____	=	livable
(29)	_____	+	_____	=	serviceable
(30)	_____	+	_____	=	valuable
(31)	_____	+	_____	=	profitable
(32)	_____	+	_____	=	changeable
(33)	_____	+	_____	=	deniable

(1 point)

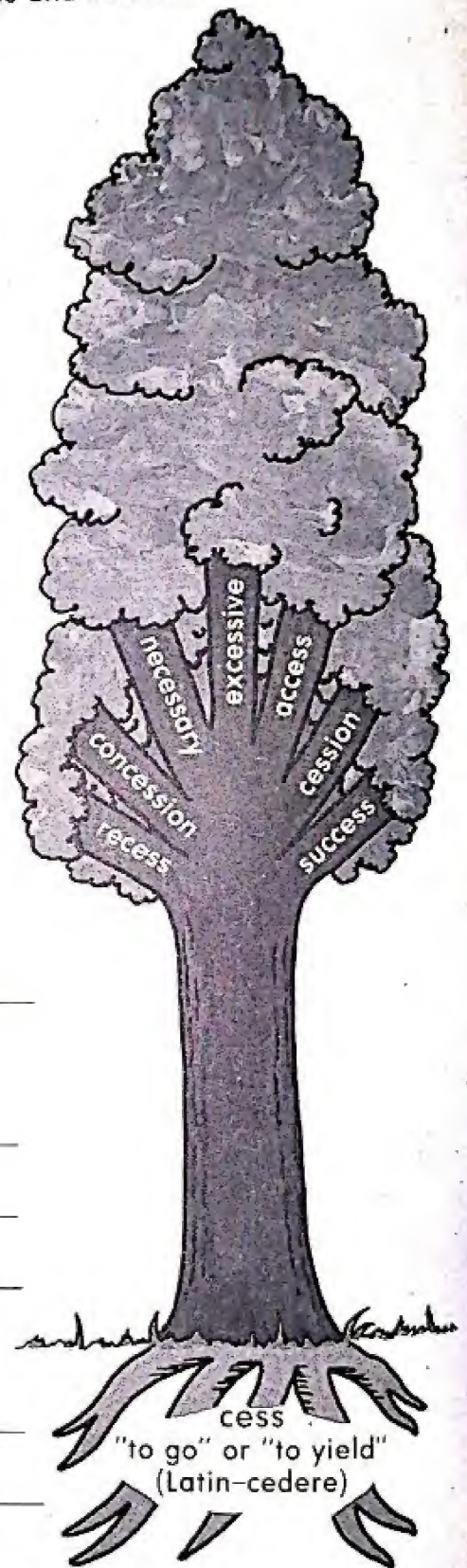
Say from memory as much of Colossians 3:13 as you can. Check yourself by looking up the verse in your Bible. Use your Bible to complete the verse on the lines below.

- (34) Forbearing one another, and _____
- _____
- _____

D13 p. 33-34 + Greek Lip

Add the root "cess" (meaning "to go" or "to yield") to these prefixes and suffixes.

- (1) _____ + ation = _____
- (2) _____ + ion = _____
- (3) _____ + ion + ary = _____
- (4) ac + _____ = _____
- (5) ac + _____ + ary = _____
- (6) abs + _____ = _____
- (7) ex + _____ = _____
- (8) ex + _____ + ive = _____
- (9) inter + _____ + ion = _____
- (10) inter + _____ + or = _____
- (11) ne + _____ + ary = _____
- (12) ne + _____ + ity = _____
- (13) pro + _____ = _____
- (14) pro + _____ + ion + al = _____
- (15) re + _____ = _____
- (16) re + _____ + ion = _____
- (17) re + _____ + ive = _____
- (18) se + _____ + ion = _____
- (19) suc + _____ = _____
- (20) suc + _____ + or = _____
- (21) con + _____ + ion = _____
- (22) pre + de + _____ + or = _____



(23) What is the meaning of the root "cess"? _____

Checkup

My score _____
(2 points each)

On a separate sheet of paper, write each spelling word three times. Score the words very carefully. Each word must be spelled correctly all three times to score two points.

- | | | | | |
|-----------------|----------------|------------------|------------------|-----------------|
| (1) volume | (5) solemn | (9) prominent | (13) justifiable | (17) accessible |
| (2) responsible | (6) probably | (10) opportunity | (14) usable | (18) legible |
| (3) pillow | (7) possession | (11) pollen | (15) corps | (19) credible |
| (4) society | (8) poultry | (12) novel | (16) favorable | |

Using the spelling words and the definitions that you have learned, fill in each blank with the correct spelling word from the list above.

- (20) A serious, or _____, statement is found in Colossians 3:13.
- (21) We are _____ before God to be forgiving.
- (22) If we are to be _____ vessels, we must be forgiving.
- (23) This is not what _____ tells us.
- (24) However, in the _____ of God's Word, this principle is commanded.
- (25) When did you last have an _____ to be forgiving?
- (26) It was _____ not too long ago!
- (27) We never have a _____ (defensible) reason to be unforgiving.
- (28) God's forgiveness is _____ to all who desire it.
- (29) How could we _____ our head in peace at night without God's forgiveness?
- (30) To be forgiving is not only pleasingly helpful, or _____, it is wise.

On the lines below, complete the PACE Scripture from memory.

- (31) Forbearing one another, and _____

Please continue on the next page.



Let's get ready to take the Self Test.

1. Study the Checkups.
2. Read all teaching strips and examples in this PACE before doing the Self Test.
3. Ask your supervisor to initial here. _____
4. Answer as many questions as you can without looking back into your PACE.

My score _____
(1 point each)

Self Test

Be sure you know how to spell these words.

Ask your supervisor to say these words to you.

Write the words on a separate sheet of paper.

(1) hoe	(14) squash	(27) serviceable	(40) permissible	(53) possession
(2) clog	(15) host	(28) traceable	(41) resistible	(54) poultry
(3) hoarse	(16) smog	(29) changeable	(42) terrible	(55) prominent
(4) core	(17) lodge	(30) valuable	(43) collapsible	(56) opportunity
(5) rot	(18) honest	(31) manageable	(44) collectible	(57) pollen
(6) role	(19) honk	(32) conformable	(45) livable	(58) novel
(7) wore	(20) roast	(33) profitable	(46) convertible	(59) justifiable
(8) roam	(21) spore	(34) noticeable	(47) volume	(60) usable
(9) zone	(22) oath	(35) sensible	(48) responsible	(61) corps
(10) pose	(23) solve	(36) reliable	(49) pillow	(62) favorable
(11) source	(24) dependable	(37) perceptible	(50) society	(63) accessible
(12) boast	(25) curable	(38) reversible	(51) solemn	(64) legible
(13) mold	(26) advisable	(39) deniable	(52) probably	(65) credible

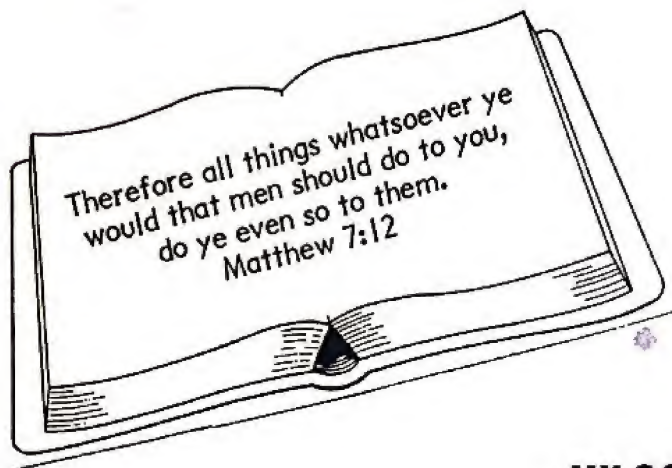
Draw a line under any words you missed; then write them five times.

Match each definition with the correct spelling word.

- | | |
|-------------------|---|
| _____ (66) honest | (A) an area different from another |
| _____ (67) roam | (B) to live temporarily in a place |
| _____ (68) oath | (C) being fair and upright; truthful |
| _____ (69) lodge | (D) having a rough, deep sound |
| _____ (70) wore | (E) to wander about with no special purpose |
| _____ (71) squash | (F) a pumpkinlike fruit used as a vegetable |
| _____ (72) hoarse | (G) a solemn promise or statement |
| _____ (73) zone | (H) did wear; past tense of wear |

(74) Write the wise saying that illustrates the spellings of the *ō* sound.

VERSE



MY GOALS

- To identify four types of prisms from a drawing of the prism. (pp. 2-4)
- To learn the formulas for determining the surface area of a prism, cylinder, and sphere. (pp. 4-16)
- To use the surface area formulas to calculate the surface area of a prism, cylinder, and sphere. (pp. 4-16)
- To learn the formulas for determining the volume of a prism, cylinder, pyramid, cone, and sphere. (pp. 23-47)
- To use the volume formulas in calculating the volume of each solid. (pp. 23-47)
- To do to others as I want them to do to me in each situation. (pp. 1, 3, 6, 21, 53)

VOCABULARY

cone. A figure with a flat circular base that tapers to a point at the top.

cylinder. A long, round object with flat circular ends.

equidistant. Points that are at the same distance from a third point.

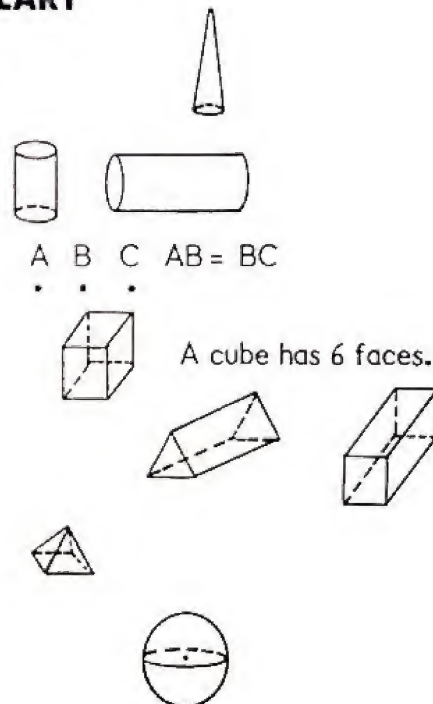
face. Side of a geometric drawing.

prism. Formed by two bases that are exactly the same size, connected by parallelograms.

pyramid. A figure having a polygon base and triangular sides which meet in a point at the top.

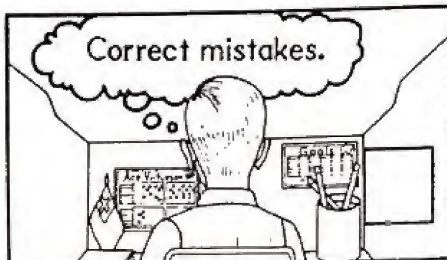
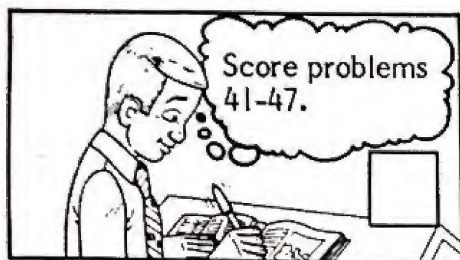
sphere. A round figure whose surface is at all points equidistant from the center.

surface area. The total area of all surfaces of an object.



Complete this verse.

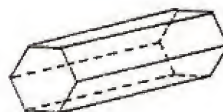
(47) Therefore _____ do ye even so
 _____ to them. Matthew 7:12



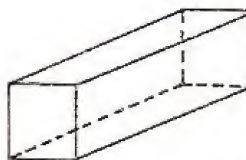
CHECKUP
 (4 points, each problem)

On the blank, write the correct name of the prism.

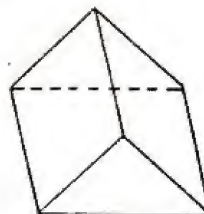
(1) _____



(2) _____

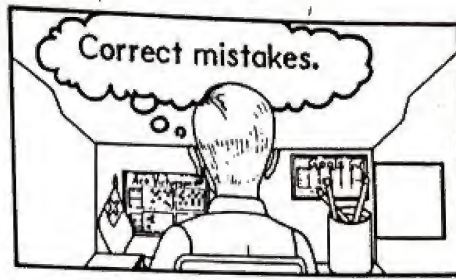
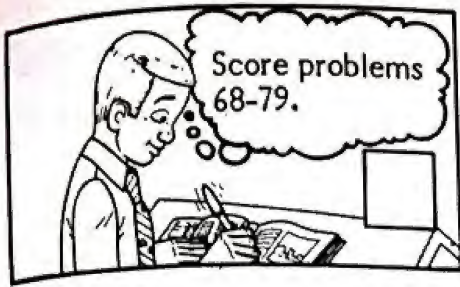


(3) _____



(4) _____





b13

CHECKUP

(4 points, each problem)

On the blank, write the letter of the correct formula.

- | | |
|---------------------------------------|---------------------------|
| (1) _____ area of a rectangle | a. $\frac{1}{3}lwh$ |
| (2) _____ volume of rectangular prism | b. $\pi r^2 h$ |
| (3) _____ volume of triangular prism | c. $\frac{1}{3}\pi r^2 h$ |
| (4) _____ volume of pyramid | d. lw |
| (5) _____ volume of cone | e. $\frac{1}{2}bhl$ |
| (6) _____ volume of cylinder | f. $\frac{4}{3}\pi r^3$ |
| (7) _____ volume of sphere | g. lwh |

Define or complete.

- (8) volume _____
- (9) In what units are volume measurements always written? _____
- (10) What value of π should be used in most volume problems requiring the use of π ? _____

b1 p. 1-8

ASIAN HISTORY 4 - 1112

Instructions

1. Become familiar with the vocabulary at the beginning of each section.
2. Scan through the entire PACE to obtain an overview of the content.
3. Then thoroughly read the PACE text completing activities that follow.



Memory Verse

"And be not conformed to this world: but be ye transformed by the renewing of your mind, that ye may prove what is that good, and acceptable, and perfect, will of God."
Romans 12:2

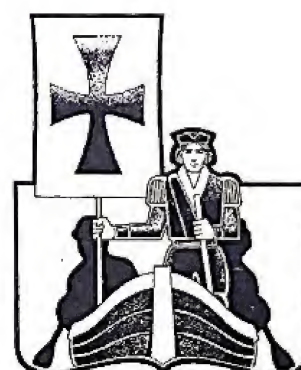
Creative

Meeting a need or a chore from a different point of view.

Age of Exploration & Colonization

Contents

- I. Prologue to Colonization
Alexander the Great
The Roman Empire
The Byzantine Empire
- II. The Invention of Printing
Renaissance
Reformation
- III. Age of Exploration and Colonization
Portugal
Spain
French
British
America
- IV. Results of Exploration and Colonization
Negative Results
Positive Results
God is in Control



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Age of Exploration and Colonization

Carefully read these pages. The Objectives tell you what you should learn in this PACE. The Vocabulary section gives the meanings of all terms introduced in this PACE.

Objectives

When you have successfully completed this PACE, you should be able:

- To understand the people, nations, and the events that lead to the Age of colonization
- To identify important events and people who made an impact in this part of our history
- To weigh the negative and positive results of this age

Vocabulary

annals *n. pl.* ('a-nəl-z) a descriptive account of record; history

austere *adj.* (o-'stir) strict or severe discipline; simple

barbarian *n.* (bār-'ber-ē-an) a member of a people considered by others as non-civilized

concubinage *n.* (kān-'kyū-bā-nij) the state of cohabitation of a man and a woman without the full sanctions of legal marriage

iconoclasm *n.* (ī-'kă-nă-,klă-zam) a practice of destroying images because it was contrary to Biblical teachings

infidels *n. pl.* ('in-fă-dəls) persons with no religious beliefs

monogamous *adj.* (mə-nă-gə-məs) relating to the condition or practice of having a single mate during a period of time

Monophysite *n.* (mə-'nă-fă-,sīt) one holding the doctrine that Christ's nature remains altogether divine and not human even though he has taken on an earthly and human body

Panhellenic *adj.* (pan-hə-'le-nik) relating to all Greece or all the Greeks

Pax Romana *n.* a state of comparative tranquility throughout the Mediterranean world from 27 B.C. to 180 A.D.

tyrant *n.* ('tī-rənt) an absolute ruler, especially a cruel and oppressive one



INTRODUCTION

God is sovereign. He is Somebody so boundless, that our finite minds can never completely comprehend Him. In this study, we will attempt to go deeper into man's achievements and even his foolishness to see how God orders things for His glory. His plans are perfect and will come to pass no matter what man does.

PROLOGUE TO COLONIZATION

Alexander the Great

Alexander the Great. The first attempt by the west to dominate Asia was done by Alexander the Great a Macedonian warrior and statesman of brilliant academic and military background. He was born on July 20, 356 B.C. at Pella, Macedonia's capital (now in Yugoslavia).

His education. Because of his potential greatness, Alexander's education was carefully arranged. His first teacher was Leonidas, a relative of his mother. He was a rigid man of discipline who inculcated his *austere* lifestyle to Alexander. Later in his life, this characteristic made Alexander famous because he lived simply, just like his soldiers. The next teacher of Alexander was Lysimachus, who trained him how to play the lyre and developed in him an affection for music, poetry, and drama.





From age 13 to 16 he was taught by the Greek philosopher Aristotle, who aroused his interest in philosophy, medicine, and scientific investigation. However, later on, he disagreed with his teacher's principles that non-Greeks should be regarded as slaves because they were barbarians. Alexander sought to blend Macedonians and non-Greeks.

As a young prince. Alexander matured early. A famous amusing story describes that when he was five or six years old, he received Persian emissaries in Philip's court while his father was gone supervising his troops. Alexander was skillful and impressed his father's visitors. He also tamed a wild horse, which he named Bucephalus and rode him throughout his conquests.

On account of his excellent education and rigid training, Alexander turned out to be Macedonia's best fighter and dynamic leader. In 340 BC, at the age of 16, while his father Philip was attacking Byzantium, Alexander defeated a local rebellion in Maedi against a Thracian people. Two years later, he helped his father at the Battle of Chaeronea, where Philip defeated the allied Greek states.



Family ties. Philip and Alexander never got along well with each other. It was known that Alexander had always been closer to his mother Olympias than to his father. Also, Philip and Olympias did not get along very well because Olympias was of "barbarian" ancestry as she came from Epirus, which is presently Albania. The family was finally shattered when Philip married Cleopatra, a Macedonian woman. They remained as family in name only until Philip was assassinated.

True or False.

- _____ 1. God is sovereign and orders things for His glory.
- _____ 2. God's plans are perfect and will come to pass no matter what man does.
- _____ 3. Because of his potential greatness, Alexander's education was carefully arranged.
- _____ 4. Because of his riches, Alexander lived a luxurious life.
- _____ 5. Alexander's family was a happy one even after Philip was assassinated.

Fill in the blanks.

6. The first attempt by the West to dominate Asia was done by _____.
7. He was born on July 20, 356 B.C. at Pella, _____ capital (now in Yugoslavia).
8. His interest in philosophy, medicine, and scientific investigation was aroused by the _____.
9. He also tamed a wild horse, which he named _____, and rode him throughout his conquests.
10. His mother _____ was of barbarian ancestry as she came from Epirus, which is presently Albania.
11. The father of Alexander was _____.
12. Austere is a word which means _____ or severe _____.
13. A _____ is a member of a people considered by others as non-civilized or primitive.

Campaigns in Asia. After the death of his father, Alexander was recognized by the army, and he replaced Philip without resistance. He was appointed "genera-lissimo" by the Greek League at Corinth for the anticipated attack of Asia, which was designed and started by his father.

Philip first dreamed of the invasion of Asia. His military innovations created a fighting power that his son, Alexander, inherited. Alexander had various objectives for his Asian invasion. He was authorized to lead a **Panhellenic** offensive against the Persian Empire to free the world of oppression and to retaliate for the Persian invasion of Greece in 490 BC. He also aimed to establish the first Eurasian empire for his own fame and create a blend of cultures - Western Greek and the East.

In the spring of 334 BC, leaving behind Antipater as his deputy in Europe with 13,000 men, Alexander marched across the Dardanelles. With him were about 30,000 foot soldier's and over 5,000 cavalry, of whom nearly 14,000 were Macedonians while 7,000 others were allies dispatched by the Greek League. This army had a balanced combination of arms.

Before long the Macedonian troops met the Persian army under King Darius while crossing the river Granicus near the Aegean coast. Alexander's men fought their way up the steep riverbank to meet the Persians in face to face combat. In 334-333, Alexander encountered Darius in battle for the second time at Issus, which was a gateway to Syria. Alexander won a decisive victory although Darius escaped, deserting his family.

From Issus, Alexander went south into Syria and Phoenicia. His aim was to isolate the Persian fleet from its bases in order to destroy it. In 332 BC, after his campaign in Phoenicia secured the Aegean coast, he marched into Egypt. The Egyptians gladly received him as their liberator. At Memphis Alexander sacrificed to Apis, sacred Egyptian bull, and was crowned with the traditional double crown of the pharaohs. He organized Egypt and founded a city and named it Alexandria in his honor.

In 331 BC, Alexander left Egypt in pursuit of Darius and proceeded to conquer the lands between the Tigris and Euphrates rivers. The conclusive combat of the war was fought on the plain of Gaugamela near Nineveh. Alexander chased the beaten Persian troops for 35 miles to Arbela, but Darius fled to Media. After his victory, Alexander was called the King of Asia. He proclaimed to all Greek cities that the **tyrant** was gone.

Alexander continued to hunt for Darius until finally, after a combat, he found him dead in his coach, stabbed and left to die by his own men. Alexander had the assassins executed and sent Darius, body for burial with due honors in the royal tombs at Persepolis. After Persia, Alexander with a reinforced army entered India in 327 and the toughest fighting in his career. The topography, the heavy rains, the ferocious tribes and the long years of battle were more than the Macedonians could bear. His men refused to go farther.



"The topography, the heavy rains, the ferocious tribes and the long years of battle were more than the Macedonians could bear. His men refused to go further..."

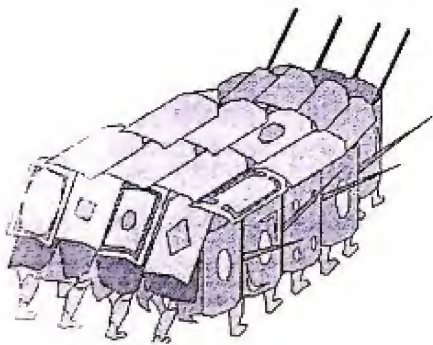


Fill in the blanks.

1. Alexander was appointed " _____ " by the Greek League at Corinth for the anticipated attack of Asia.
2. It was _____, Alexander's father, who first dreamed of the invasion of Asia.
3. Alexander organized Egypt and founded a city and named it _____ in his honor.
4. After his victory, Alexander was called the _____ of _____ and he proclaimed that the tyrant was gone.
5. It was in _____ that Alexander had the toughest fighting in his career.
6. _____ is a word which describes things or practices related to Greeks.
7. A _____ is an absolute ruler especially a cruel and oppressive one.

True or False.

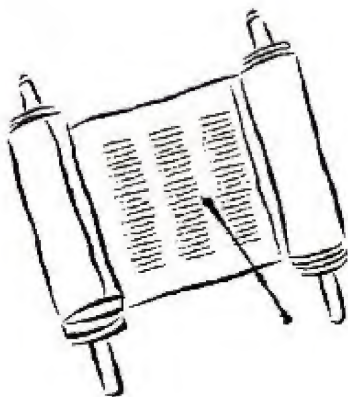
- _____ 8. Alexander rewarded the assassins of King Darius for killing him.
- _____ 9. In India, his men refused to go further.



The rest of Alexander's life was spent in trying to attain his goals of blending the East and the West. In the spring of 324 BC, he was back in Susa, the administrative capital of the Persian Empire. In order to implement his plan of fusing the Macedonians and Persians into one master race, he and 80 of his officers took Persian wives. He married Darius' daughter Barsine (also called Stateira) and 10,000 of his soldiers with Persian wives were granted bountiful dowries.

In 323 BC, Alexander traveled to Babylon with his men. Wounds and exhaustion weakened him. To make matters worse a prolonged banquet and drinking bouts made him very ill with fever. On June 13, 323, Alexander the Great died at the age of 33. He had reigned for 12 years and eight months. There was an unusual silence in Babylon for four days as people mourned the loss of a great warrior and leader. His body was carried in a golden coffin to Alexandria-the city he founded and named after himself.

After Alexander. The Eurasian empire fell apart almost instantly after the death of Alexander the Great. The empire was divided into three: The Ptolemaic Kingdom of Egypt, the Seleucid Empire of Asia and the Antigonid Empire of Macedonia.



Alexander's short reign marked a decisive era in the history of Europe and Asia. His efforts led to the spread of Hellenism throughout the Middle East. The koine Greek as a lingua franca, facilitated communication among Eastern and Western peoples. The spread of Greek culture and language became his most enduring gift to world annals and made the world ready for the advent of Jesus Christ. Humanly speaking, it is therefore right to declare that the Roman Empire, the spread of Christianity, and the many centuries of Byzantium were all in some way the results of Alexander's accomplishments.

Fill the blanks.

1. Alexander's life was spent trying to attain his goals of _____ the East and the West.
2. Prolonged _____ and _____ bouts made Alexander very ill with fever, which ushered to his death.
3. After the death of Alexander the Great the empire was divided into three parts: the _____ Kingdom, the _____ Empire and the _____ Empire.
4. The word _____ is a plural word for a descriptive account of record or history.
5. The koine Greek as a _____ facilitated communication among Eastern and Western peoples.

The Roman Empire

The Founding of Rome. Known as the "Eternal City", Rome was established in the very early days of civilization. The Romans believed that their "City on the Seven Hills" was founded in the year 753 BC but modern historians believe it was the year 625 BC.

The Roman Republic. Early Rome was ruled by Etruscan kings. After driving away the Etruscans, they founded the Roman Republic which lasted from 509 to 31 BC.

The word "republic" came from the Latin words "*res publica*" which mean "public matters" or "matters of the state". The monarchy was abolished and the Romans replaced the sovereignty with two yearly elected magistrates called consuls. The Senate, Rome's governing body, also appointed a dictator in place of the consuls, who held supreme military command for six months. Roman Republic was not democratic because while in philosophy the people were sovereign and the Senate only offered advice, in actual practice the Senate was controlled by the aristocracy called "patricians". The poor people who were called the "plebeians" had nothing to say in the running or control of the state.

The Roman Republic was a successful government. It lasted for almost 500 years. Carthage, their bitterest enemy which had a superior naval power, was defeated under Scipio Africanus the Elder. The downfall of this mighty rival encouraged Rome's acquisitive drive. They fixed their visions on the whole Mediterranean domain. In 146 BC, Syria, Macedonia, Greece, Egypt, Palestine, Bithynia, Mesopotamia and other kingdoms were annexed as Roman provinces.

**Fill in the blanks.**

1. Rome, known as the _____, was founded in the very early days of civilization.
2. Early Rome was ruled by _____.
3. The word republic came from the Latin word "_____" which mean "public matters".
4. The Senate was Rome's _____.
5. Senate was controlled by the _____ called "patricians".
6. The poor people who were called the "_____" had nothing to say in running control of state.

True or False.

- _____ 1. Rome was truly democratic because they had a Senate that was their governing body.
- _____ 2. The Roman Republic was a successful government which lasted for nearly 500 years.



"Persecution did not stop the spread of Christianity. Many Romans were touched by the courage of the martyrs in giving up their lives for their faith."



The Imperial Rome. Because Rome focused on how to conquer other lands, they neglected their citizens at home. Pressures mounted and civil wars exploded. The following period of unrest and revolution resulted in the transition of Rome from a republic to an empire. Two classes of people clashed against each other: the aristocratic party and the peoples' party. In order to suppress people's ire, clever politicians gave free bread and entertainment to the masses.

In 60 BC, notable figures appeared on the scene. They were Pompey, Crassus and Julius Caesar. Each went on military conquests to win honor and popularity in the empire. However, it was Julius Caesar's military accomplishments that made him great for the Romans. As a result, the Senate made him dictator for life. Julius Caesar proved to be a strong leader.

His fame, however, ended when he was assassinated in March 15, 44 BC. After his murder, the triumvirate of Mark Anthony, Lepidus, and Octavian, who was Caesar's nephew, ruled. Rome's first emperor was Octavian who acquired the name Augustus. His reign, from 27 BC to AD 14, was distinguished by stability and peace. Under Augustus, the empire started to experience the *Pax Romana*, ("Roman Peace") from 30 BC to AD 180. It was during his reign that the Savior Jesus Christ was born in Bethlehem of Judea, which was a province of the Roman Empire. It was while Tiberius (14-57 A.D.) ruled that Jesus Christ had his earthly ministry, was crucified, resurrected and ascended to heaven.

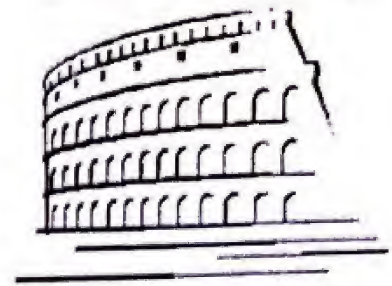
The emperors came to be looked upon as gods. Thereafter, all good emperors were worshiped as gods after death. Among the rulers of Rome were Trajan (reigned 98-117 A.D.), Hadrian (117-138 A.D.), Antoninus Pius (138-161 A.D.) and Marcus Aurelius (161-180 A.D.).

Bloodthirsty rulers also rose to power. Caligula (37-41 A.D.) had his horse elected as consul and became insane and was killed by his own bodyguards. Claudius (41-54 A.D.) was a weak ruler and was poisoned by his niece and fourth wife Agrippina the Younger. His son Nero (54-68 A.D.) persecuted the Christians, blaming them as the cause of a big fire that nearly destroyed Rome. It was during his reign that hundreds of New Testament believers were martyred. He took away their properties. They were imprisoned, fed to the beasts, and some were burned as torches. However, persecution did not stop the spread of Christianity. Many Romans were touched by the courage of the martyrs in giving up their lives for their faith.

The persecution of Christianity ceased during the rule of Constantine I (312-337 A.D.). In 313, a decree for all religions was issued. From 320, AD the Roman State favored Christianity. When the last emperor Theodosius died, in 395 AD, Rome was divided into Eastern and Western empires. The decline of Rome was concluded in 476 A.D., when the Visigoths and Germanic tribes deposed the last Roman emperor of the West. While the Roman Empire declined, a new religion,

Christianity blossomed and attracted more followers and became the official religion of the empire. The East, richer and stronger, continued as the Byzantine Empire. This official religion gave birth to the Roman Catholic Church which continued to grow strong in spite of the decline of the Roman empire.

There are many reasons why the Roman Empire declined. To name a few: 1) the empire weakened due to a lack of able leaders and the prevalence of graft and corruption; 2) economic regression and heavy taxation; 3) superb military power which fought out of patriotic duty was overpowered by mercenaries fighting for money; 4) the weakening spirit and lack of cultural growth brought cultural decline; and 5) deterioration of Roman character caused by too much materialism, immorality and drunkenness.



True or False.

- _____ 1. Because of Rome's focus on conquering other lands, they neglected their citizens at home which led to unrest and civil wars.
- _____ 2. All good Roman emperors were worshipped as gods after their death.
- _____ 3. During the reign of Nero, persecutions stopped the spread of Christianity.

Fill in the blanks.

4. In order to suppress the people's anger, clever Roman politicians gave free _____ and _____.
5. As a result of his military conquests, the Senate appointed Julius Caesar _____ for life.
6. _____ was a state of tranquillity throughout the Mediterranean world from 27 BC to 180 AD.
7. During the reign of _____, the Savior Jesus Christ was born in _____ of Judea, which was a _____ of the Roman Empire.
8. While Tiberius ruled, Jesus Christ had his _____, was crucified, _____ and ascended to heaven.
9. Emperor Caligula had his _____ elected as consul and became insane and was killed by his own bodyguards.
10. Nero persecuted the Christians blaming them as the cause of a _____ that nearly destroyed _____.
11. The persecution of Christianity ceased during the rule of _____.
12. Emperor Octavian later acquired the name _____.
13. **THINK!** What was the reason why persecutions did not stop the spread of Christianity?

Enumerate.

14. Describe specifically what Emperor Nero did to the Christians:

- | | |
|----------|----------|
| a) _____ | c) _____ |
| b) _____ | d) _____ |

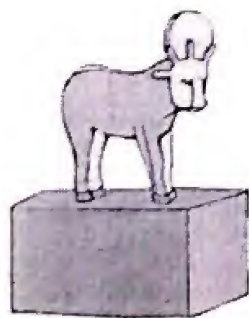
Supervisor's Initial _____ 8

15. Five reasons for the decline of the Roman Empire.

- a) _____
- b) _____
- c) _____
- d) _____
- e) _____



"The Justinian Code: the Roman law blended with Biblical principles. Justinian's legislative moves were greatly inspired by his graceful and godly wife Empress Theodora."



The Byzantine Empire

Byzantine Empire or the Eastern Roman Empire (330 – 1453) was the eastern section of the Roman Empire, which came through after the breakup of the Western Empire in the 5th century AD. Its capital was Constantinople (now Istanbul, Turkey). It became a capital of the Roman Empire in 330 after Constantine the Great reestablished the city of Byzantium and named it after him. Greek was the predominant language, though some of its dependents spoke Latin, Coptic, Syriac, and Armenian. The empire became a melting point of Roman institutions, orthodox Christianity, and Greek language and culture.

In AD 527, Justinian I the Great became the emperor of the Eastern Empire. Under his reign, they were able to defeat the Vandals, Ostrogoths, and Visigoths and reestablish total control over Italy. Justinian's greatest personal accomplishment was the Justinian Code - the existing Roman law which he blended with Biblical principles. Justinian's legislative moves were greatly inspired by his graceful and godly wife Empress Theodora.

Empress Theodora was the most famous woman character during her time. When she was young, poverty drove her to become an actress and later on to immorality which was often connected to the craft. Theodora was rescued from immorality when she was converted and became a **Monophysite** Christian. Her greatest achievement was in the area of lawmaking. She sponsored a law stopping the sale of girls for immoral purposes and abolished legal **concubinage**. Her reforms on marriage and family instituted **monogamous** marriage as the only legitimate form of sexual relationship. She also enacted laws on divorce, which gave women better privileges.

Invasions. After Justinian, Barbarian invasions threatened the frontiers of the empire from all sides. The Lombards and other Germanic tribes attacked Italy. During the rule of Heraclius (610-641 A.D.); the Arabs, inspired by a new religion, Islam, arose in the Arab Peninsula and conquered the Middle East and North Africa. Constantinople suffered from superior Arab attacks in the 670s.

The Iconoclastic Controversy. A distinguished general saved Constantinople during the second attack by using a new weapon called the "Greek fire". After driving away the Arabs, he took the position as Emperor Leo III. A great controversy rocked the empire from 726 to 843. Emperor Leo III issued a law advocating **iconoclasm**. Iconoclastic emperors required all religious images eliminated from the churches because the Bible forbids worshipping graven images. Those who worshipped images finally won the conflict and in the meeting of the second Council of Nicaea, the veneration of the cross and religious pictures were authorized.

From the 11th to the 15th century, the Islamic Turks distressed the Byzantine Empire. The people of the Western Christendom were called on to help drive out the "infidels." Crusaders responded to the call but with a different motive. They wanted to occupy Byzantine territories and plunder Constantinople just like the Muslims did. In 1204 A.D., the city was ravaged by Venetians from Italy during the Fourth Crusade. Byzantine regained control of the city in 1261 but the empire never recovered from the destruction brought about by the Crusaders. In 1453 A.D., Turks attacked Constantinople. They broke down the walls, plundered the city, and killed thousands of people. On May 29, 1453, it totally fell after two months of battle. The Byzantine Empire ended after more than a thousand years.

The Byzantine Empire may have ceased to exist, but its greatest contribution to mankind still lives on. It is the preservation of the Greek New Testament. The Eastern Church's Byzantine text became the foundation of the Greek New Testament done by Erasmus in 1516. It was also the basis of all Protestant translations of the New Testament during the Reformation, as well as the 1611 King James Version.



**"Byzantine Empire's
greatest contribution
to mankind is the
preservation of
the Greek New
Testament."**

Fill in the blanks.

1. Byzantine Empire or the _____ was the eastern section of the Roman Empire.
2. The capital of Byzantine Empire was _____ which is presently Istanbul, Turkey.
3. Emperor Justinian's greatest personal accomplishment was the Justinian Code - the existing Roman law that he blended with _____.
4. Justinian's legislative moves were greatly inspired by his graceful and godly wife Empress _____.
5. A _____ is someone holding the doctrine that Christ's nature remains altogether divine and not human even though he has taken on an earthly and human body.
6. Monogamous is a word that describes the condition or practice of having a _____ during a period of time.
7. _____ is the state of cohabitation of a man and a woman without the full sanctions of legal marriage.
8. Empress Theodora was rescued from immorality when she was converted and became a _____.
9. _____ was a practice of destroying graven images because it was contrary to Biblical teachings.
10. The Eastern Church's Byzantine text became the foundation of the _____ done by Erasmus.
11. _____ were persons with no religious beliefs.
12. The Greek New Testament done by Erasmus in 1516 was the basis of all Protestant translations of the New Testament during the _____, as well as the 1611 _____.
13. The Greek New Testament was the Byzantine Empire's greatest _____ to mankind.

Score pages 3 - 10. <input style="width: 40px;" type="text"/>	Correct mistakes. <input style="width: 40px;" type="text"/>	Rescore. <input style="width: 40px;" type="text"/>
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Vocabulary

- bull** *n.* ('bʊl) an official document issued by the pope
- feudalism** *n.* ('fyu-dəl-i-zəm) a political and economic system in Medieval Europe by which a landowner granted land to another in exchange for loyalty and military service
- heresy** *n.* ('her-ə-sē) an opinion or doctrine contrary to accepted religious belief
- heretic** *n.* ('her-ə-tik) a person who possesses unaccepted religious belief
- Humanism** *n.* ('hyu-mə-ni-zəm) a Renaissance movement that emphasized secular concerns as a result of the rebirth of Classical literature, art and civilization
- indulgences** *n. pl.* (in-'dəl-jən(t)s) the decrease of intensity of temporal punishment due for a sin that has been pardoned
- laity** *n.* ('lā-ə-tē) nonprofessional people; laypeople collectively
- monasticism** *n.* (mə-'nas-tə-si-zəm) an institutionalized religious movement whose members attempt to practice a life of seclusion and self denial for religious purposes
- penance** *n.* ('pe-nən(t)s) a Catholic sacrament for the forgiveness of one's sins
- relics** *n. pl.* (re-'liks) objects of religious veneration
- Renaissance** *n.* (re-nə-'sān(t)s) a humanistic revival of classical art, architecture, literature and learning in Europe
- sacraments** *n.* ('sa-kra-mənts) in Catholic churches, the rites instituted by the Pope that provide sanctifying grace
- tenet** *n.* ('te-nət) a doctrine or principle held to be true



THE INVENTION OF PRINTING



The Origin. The Chinese apparently had discovered printing by the end of the 2nd century AD. They then had the three elements needed for printing: (1) paper (2) ink and (3) surfaces bearing texts carved in relief. Buddhist texts were inscribed on marble pillars, on which pilgrims placed sheets of damp paper, patting the surface with ink so that the parts that bulge out in relief showed up.

Around 1041–48 AD, a movable type made of an amalgam, clay and glue hardened by baking was invented by a Chinese alchemist named Pi Sheng. Around 1313 AD, a Chinese magistrate named Wang Chen had a craftsman shape more than 60,000 characters on movable wooden blocks so that the history of technology could be published. However, Wang Chen's invention, like that of Pi Sheng's, was not given the necessary attention.

On the other hand, in Korea, typography, which had emerged by the first half of the 13th century, was totally improved under the support of King Htai Tjong, who ordered the first set of 100,000 pieces of type to be cast in bronze in 1403. Other modifications followed from then to 1516. Later, Europe had its turn discovering typography.

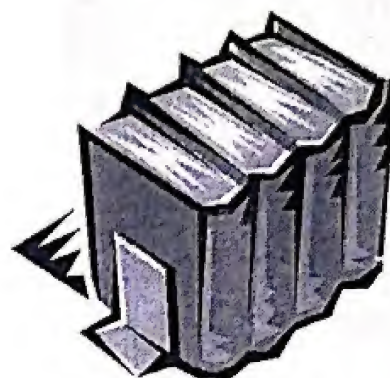
Johann Gutenberg. The essential elements of the printing process collected slowly in Western Europe, where an agreeable cultural and economic climate had formed. Johann Gutenberg, considered as the *Father of Modern Printing*, was a German who had a wooden press that was the first model of printing to operate movable type. Before Gutenberg's invention, most books were produced using the wood engraving. This needed a craftsman to chisel away the setting, leaving the portion to be printed elevated.



But the use of metal type made printing easier and faster. In 1455, the 42-Line Bible, also known as the Gutenberg Bible, was published in Mainz. It is regarded to be the first important publication which took two years to finish.

The printing press became so famous that by 1500 AD, there were an estimated nine million books in Europe against a few thousand manuscripts before that time. However, **Renaissance** Italians treated the new invention with displeasure because printed books seemed inferior and tasteless in contrast with their handwritten manuscript. They disliked the idea that people from all status can be exposed to learning which they wanted only for themselves.

The Bible-centered scholars, however, thought differently. They welcomed the new invention as a way whereby affordable books could be made available to the common people. The printing press would make the Bible accessible to every person. Later, a scholar named Erasmus prepared a text of the New Testament in the original language so that the Scriptures could be translated into languages for all people to read.



True or False.

- _____ 1. It is said that the Chinese were the first people to discover printing.
- _____ 2. Most of the early printings were Buddhist texts inscribed on marble pillars.
- _____ 3. The Renaissance Italians were pleased with the invention of the printing press.
- _____ 4. To Bible scholars, the invention of printing will enable all people to read God's Word.

Fill in the blanks.

5. The Chinese had the three elements needed for printing: _____, _____ and _____ bearing texts carved in relief.
6. Johann Gutenberg is considered as the _____ of _____.
7. The _____, known as the Gutenberg Bible, is regarded to be the first important publication which took two years to finish.
8. The printing press became so famous that by 1500 AD, there were an estimated _____ books in Europe against a few thousand manuscripts before that time.
9. A scholar named _____ prepared a text of the New Testament in the original language.

Complete your verse.

"And be not _____ to this world: but be ye _____ by the renewing of your mind, that ye may prove what is that good, and acceptable, and _____, will of God."

Romans 12:2



"The Western Christian Church was later on called the Catholic Church or the Roman Catholic Church."



Renaissance and Reformation

Middle Ages. In order to understand Renaissance, we will first look at the events that led to it. Historians date the Middle Ages as the century between the fall of Rome in the West (Europe) to the fall of Constantinople in the East (Asia). The early part of the Middle Ages was called the Dark Ages because it was characterized by chaos. It was the time when the light of civilization went out. Barbarians vandalized the once glorious empire. Buildings, roads, and bridges were left to disintegrate. Travel and trade were discouraged and all forms of learning stopped.

The Rise of the Roman Catholic Church. After the disintegration of the Roman Empire, the Roman church stood as its heir. The bishop was in due time called pope, which came from the Latin word "papa." Early medieval popes took advantage of the chaos and claimed power over the institutional church and society. The Western Christian Church was later on called the Catholic Church.

During the Middle Ages the Church became the richest institution. People gave one-tenth of their income which was called "tithe" and every family gave a penny a year for church maintenance. The Church was also the most systematic and organized establishment in the West. Eventually, the pope, as head of the church, became powerful in both spiritual and temporal matters.

Feudalism. During the Middle Ages, lords sought help from their fellow nobles. Supports were in the form of a piece of land and in exchange for the military assistance, one lord gave land to another lord. This piece of land was called fief (feef). The noble-recipient was called a vassal. The lord-vassal relationship was strengthened by a vow of loyalty to the lord. In exchange for this pledge of loyalty, the vassal received the lord's protection and a grant of land. Together with the fief, the peasants living in it were also granted to the vassal. Crops were raised in the fief for sustenance of everyone in it. This system of relationship was later on called feudalism.

Monasticism. When the barbarians destroyed the Roman Empire, a religious movement called monasticism arose. It is a life of self-denial and seclusion from worldly activities for religious reasons and spiritual perfection. Monks lived in monasteries away from their loved ones, where they fulfilled their vows of poverty, chastity and obedience.

Monks tried to keep the flame of learning alight. In the midst of chaos due to the barbarians, monks salvaged Greek and Roman books. Because the monks were the only people who can read and write, the monasteries were the only places of learning. Consequently, the monks were the only people allowed to read the Bible. The laity or the common people were not to read the Bible. They must only heed the priests' interpretation.

Fill in the blanks.

1. Historians date the Middle Ages as the century between the fall of _____ in the West (Europe) to the fall of _____ in the East (Asia).
2. The early part of the Middle Ages was called the _____ because it was characterized by chaos.
3. People gave one-tenths of their income, which was called _____, and every family gave a penny a year for church maintenance.
4. The piece of land that one lord gave to another lord was called _____.
5. The lord that received the fief was called _____.
6. When the barbarians destroyed the Roman Empire, a religious movement called _____ arose.
7. Monks lived in monasteries away from their loved ones, where they fulfilled their vows of _____ and _____.

True or False.

- _____ 1. In the midst of chaos caused by barbarians, monks salvaged Greek and Roman manuscripts.
- _____ 2. Monks interpreted the Bible for the masses.
- _____ 3. The common people were allowed to read the Bible.

Renaissance. During the year 1300 AD, a great surge of interest for Latin and Greek literature arose in Italy. Historians call the period immediately following the Middle Ages as the era of Italian Renaissance. The word renaissance is a French word, which means "rebirth". Besides learning, the Renaissance also marked the discovery and exploration of new lands, the replacement of the Copernican for the Ptolemaic system of astronomy, the decay of the feudal system, the development of commerce, and the invention of printing, the mariner's compass, and gunpowder. However, to the scholars and historians it was above all a time of the rebirth of classical learning and wisdom following an extended era of cultural decay and stagnation.

The growing deficiency of the Roman Catholic Church and the increasing authority of European rulers ushered the emergence of Renaissance. Events that occurred towards the end of the Middle Ages, especially during the start of the 12th century, led to a series of social, political, and intellectual transformation that culminated in the Renaissance.

Interest in Greek and Roman learning focused into **Humanism**. Humanism was a Renaissance movement that anticipated a rekindling of the ruined human spirit and wisdom. A study called humanities focused on subjects such as history, grammar, speech, and poetry. The heart of humanities is man – his pleasure and pains. It emphasized his dignity over all worldly things. Instead of the medieval ideal of a life of penance as the most meritorious pattern of human action, the Humanists looked to the struggle of creation and the attempt to exercise power over nature.

"A study called humanities, focused to subjects such as history, grammar, speech and poetry."





Many names appeared during the Renaissance period. Some of them were:

- 1) Francesco Petrarch, the Father of Humanism, who believed that there was no conflict between pagan and Christian thought;
- 2) Giovanni Boccaccio, who wrote the *Decameron* a collection of 100 stories which were written to entertain;
- 3) Niccolo Machiavelli who wrote *The Prince*, a political book which advocated that a ruler, in order to stay in power, must be merciless and unscrupulous, and the false tenet that "the end justifies the means";
- 4) Desiderius Erasmus, a great Dutch scholar, linguist and theologian, who wrote *In Praise of Folly*, a book which mocked the stupidity of the Church, and prepared a text of the *New Testament in the original language*;
- 5) Leonardo da Vinci, the great painter, inventor and scientist who did the famous *Last Supper* and the *Mona Lisa*;
- 6) Michelangelo, a poet, sculptor and painter, who made statues of *Moses* and *David*, painted the *Conversion of Paul*, the *Martyrdom of Peter* and the ceiling of the *Sistine Chapel* which depicts the story of *Creation* and the *Great Deluge*;
- and 7) Raphael, the youngest of the Renaissance artists who painted the *Sistine Madonna*, which is recognized as the finest painting in the world.

Fill in the blanks.

1. The era of Italian Renaissance was characterized by a great surge of interest for _____ and _____ literature.
2. The word _____ is a French word, which means rebirth.
3. _____ was a Renaissance movement that emphasized secular concerns as a result of the rebirth of classical literature, art and civilization.
4. A study called humanities, focused on subjects such as _____, grammar, _____ and poetry.
5. The heart of humanities is man's pleasure and pains and emphasized his _____ over all worldly things.
6. _____ is Catholic sacrament for the forgiveness of one's sins.

Match these items.

- | | |
|------------------------------|---|
| _____ 7. Francesco Petrarch | a) did the famous <i>Last Supper</i> and the <i>Mona Lisa</i> |
| _____ 8. Giovanni Boccaccio | b) wrote the <i>Decameron</i> , a collection of 100 stories |
| _____ 9. Niccolo Machiavelli | c) made statues of <i>Moses</i> and <i>David</i> |
| _____ 10. Desiderius Erasmus | d) painted the <i>Sistine Madonna</i> |
| _____ 11. Leonardo da Vinci | e) the Father of Humanism |
| _____ 12. Michelangelo | f) wrote <i>The Prince</i> |
| _____ 13. Raphael | g) wrote <i>In Praise of Folly</i> and prepared a text of the <i>New Testament in the original language</i> |

Reformation. It is the religious revolution that shook the Western church in the 16th century. Its leaders were Martin Luther and John Calvin and other religious reformers. Having far-reaching political, economic, and social effects, the Reformation became the basis for the founding of Protestantism and the rise of many Protestant groups.

The actual cause of the Reformation was the resurrection of God's Word and the revival of learning was the way essential to its emergence. Scholars realized that certain Church doctrines were against the teachings of Christ. The in-depth focus on the Word of God laid bare the evils of the Church. For hundreds of years, the church had become deeply involved in the political life of Western Europe. The subsequent intrigues and political maneuvers, combined with the church's increasing power and wealth, bankrupted the church as a spiritual might. Offenses like the sale of **indulgences** (or spiritual privileges) and **relics** and the immorality of the clergy exploited the laity.

Martin Luther. Protestant Reformation began when individuals searched desperately for the truth about God's plan of salvation. Luther's life is the story of one man who was deeply convicted of his own sinfulness against the splendor and righteousness of God. He was the man who, when he finally realized the breadth of God's love and mercy in Christ for lost sinners, stood upon the authority of God's Word against the whole world.

Martin Luther was born in Eisleben, Germany on November 10, 1483. Despite the family's insufficient income, he was granted a good education at the University of Erfurt. Luther started to be bothered with the thought of eternity when he was only 21 years old, after a close friend died. As an Augustinian monk, he tried everything humanly conceivable to appease God's fury and save his soul.

Later, as a theology professor at the University of Wittenberg, his search reached its turning point when he at last understood Paul's statement in Romans 1:17 – that the righteousness of God is revealed in the gospel of Christ and that *"the just shall live by faith."* Luther realized that God's forgiveness is free because Christ earned the righteousness of God for sinners through His obedience and death. Thus, he is forgiven because of what Christ did on the cross, not because of what he can do. Suddenly, Luther saw a God who is not only a righteous Judge but also a merciful Father who sent His Son to die on the cross for the sins of mankind. With this realization Martin Luther changed his convictions. He believed that one can be saved by the grace of God and while it is true that good works are important to the Christians, these activities did not bring salvation.

Because of his new belief, Luther came in direct discord with the institution he once faithfully served – the Roman Catholic Church. Luther questioned the teachings of the Church regarding forgiveness of sins. He criticized the use of indulgence to reduce the time of suffering before one's soul reached heaven.



"The actual cause of the Reformation was the resurrection of God's Word."



"The just shall live by faith."



On October 31, 1517 Luther nailed his famous "95 Theses" which attacked the sale of indulgences, on the door of the church in Wittenberg. This challenge for a debate on indulgences was a declaration of war against Rome. Reports of the theses reached Pope Leo X who issued a **bull** directing Luther to recant his anti-Catholic ideas or else face the risk of being excommunicated. Luther burned the bull before a big crowd. Later, the church declared him a **heretic** and a criminal but because he had become very popular with German princes and commoners, he was secretly taken to Wartburg Castle where he continued to translate the Bible into the German language.

Fill in the blanks.

1. The _____ was the religious revolution that shook the Western church in the 16th century.
2. The actual cause of the Reformation was the _____ of _____.
3. The revival of learning was the _____ essential to the emergence of the Reformation.
4. _____ was an Augustinian monk who stood upon the authority of God's Word against the whole world.
5. Martin Luther was born in _____ on November 10, 1483.
6. On October 31, 1517 he nailed his famous "_____" which attacked the sale of indulgences on the door of the church in Wittenberg.
7. A _____ is a person who possesses an unaccepted religious belief.
8. Relics are objects of _____ veneration.
9. A _____ is an official document issued by the _____.
10. After he was declared a heretic, Luther was secretly taken to Wartburg Castle where he continued to translate the _____ into the _____ language.

"The fame of the Protestant movement spread from Germany to other parts of Europe like a wildfire."



Spread of Protestant Movement. The fame of the Protestant movement spread like wildfire from Germany to other parts of Europe. Other Protestant Reformers were: 1) Ulrich Zwingli, a Swiss priest who led an attack against Rome by preaching against the veneration of the saints and the authority of the pope and declared the Bible as the only key to man's salvation; 2) John Calvin, a French lawyer, theologian, and church reformer who fled from France and settled in Geneva where he introduced democracy in church organization; 3) John Knox, a Scottish disciple of Calvin who carried Calvinism to Scotland where it came to be known as Presbyterianism, and in England where it was known as Puritanism; and 4) John Huss, who propagated Calvinism in Bohemia.

Catholic Counter-Reformation. The success of the Protestant Movement shook the papacy that it soon responded with what is known as the Counter-Reformation. Its main objective was to hinder more Catholics from being converted to Protestantism. The Church embraced new changes, not in their doctrine, but in correcting the loose manners and morals of the clergy.

The Inquisition. The Catholic Church after correcting their defects demanded unquestionable obedience from all followers. The Inquisition was revived to curb heresy in all Catholic countries. Throughout Europe, especially in Spain and Italy, Protestants were hunted down and tortured to get a confession of heresy from the victims. Because of this, Protestantism in Spain was practically destroyed and growth in other countries was stunted.

The Reformation was a movement that caused so many lives. This movement brought a lot of chaos in Europe and many reformers paid a high cost for what they believed was true. However, the effect of the movement was measureless in terms of the benefits it gave to mankind. The reading of the Bible became a celebrated practice as many people started to believe in the Biblical doctrine that salvation by grace could be attained by faith in Christ alone. People learned that man could be saved not by joining a church or by doing penance or sacraments but by trusting Christ as personal Savior.

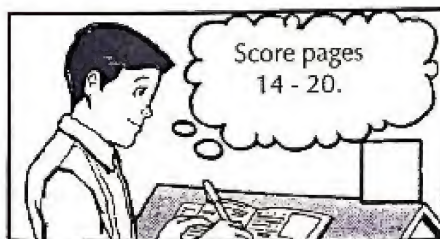


Fill in the blanks.

1. The _____ of the Protestant movement spread like wildfire from Germany to other parts of _____.
2. The success of the Protestant Movement shook the _____ that it soon responded with what is known as the _____.
3. The _____ was revived to curb heresy in all Catholic countries.
4. _____ is an opinion or doctrine contrary to accepted religious belief.
5. In Catholic churches, _____ are rites instituted by the Pope that provide sanctifying grace.
6. Many people started to believe that man could be saved not by joining a church or by doing penance or sacraments but by _____ as personal Savior.

True or False.

- _____ 7. Throughout Europe, especially in Spain and Italy, Protestants were hunted down and tortured to get a confession of heresy from the victims.
- _____ 8. The Church embraced new changes in their doctrine and also corrected the loose manners and morals of the clergy.
- _____ 9. The Reformation was a movement that caused so many lives.
- _____ 10. The main objective of the Counter-Reformation was to hinder more Catholics from being converted to Protestantism.



Answer these questions to test your understanding of this section. If you score below 90%, restudy the section. If you score above 90%, you should restudy areas you did not understand.

CHECKUP

17

My Score _____

True or False.

(3 points each)

- _____ 1. It is said that the Chinese were the first people to discover printing.
- _____ 2. Most of the early printings were Buddhist texts inscribed on marble pillars.
- _____ 3. The Renaissance Italians were pleased with the invention of printing press.
- _____ 4. To Bible scholars, the invention of printing will enable all people to read God's Word.
- _____ 5. In the midst of chaos caused by barbarians, monks salvaged Greek and Roman manuscripts.
- _____ 6. The common people were allowed to read the Bible.
- _____ 7. Throughout Europe, especially in Spain and Italy, Protestants were hunted down and tortured to get a confession of heresy from the victims.
- _____ 8. The Church embraced new changes in their doctrine and also corrected the loose manners and morals of the clergy.

Fill in the blanks.

(2 points each)

9. _____ is considered as the Father of Modern Printing.
10. The 42-Line Bible known as the _____ is regarded to be the first important publication, which took two years to finish.
11. A scholar named _____ prepared a text of the New Testament in the original language.
12. People gave one-tenths of their income, which was called _____, and every family gave a penny a year for church maintenance.
13. Many people started to believe that man could be saved not by joining a church or by doing penance or sacraments but by trusting _____ as personal _____.
14. The word renaissance is a French word, which means _____.
15. _____ is a Renaissance movement that emphasized the dignity and worth of the individual.
16. The _____ was the religious revolution that shook the Western church in the 16th century.
17. The actual cause of the Reformation was the resurrection of _____.
18. _____ was an Augustinian monk who stood upon the authority of God's Word against the whole world.
19. On October 31, 1517 he nailed his famous "_____" which attacked the sale of indulgences, on the door of the church in Wittenberg.
20. The success of the Protestant Movement shook the papacy that it soon responded with what is known as the _____.

Vocabulary

- Arawaks** *n. pl.* ('ar-ə-waks) members of an American Indian people who once inhabited the West Indies
- caravels** *n. pl.* ('kar-ə-vels) small light ships once used by the Spanish and Portuguese in the 15th and 16th centuries
- colonialism** *n.* (kə-'lɒ-ni-ə-l-iz-əm) a policy by which a nation extends and maintains its control over foreign dependencies
- dependency** *n.* (di-'pen-dən(t)-se) a territory under the rule of another country of which it is not an integral part
- Indochina** *n.* (ində-'chi-nə) a former French colonial empire in Southeast Asia comprising much of the Indochinese Peninsula
- isthmus** *n.* (is-məs) a narrow strip of land connecting two larger masses of lands
- mercenary** *n.* (mə-r-san-er-ē) a person serving a foreign army for the monetary value of service
- monopoly** *n.* (mə-'nɒ-p(ə)-le) exclusive control or ownership, as of a commodity or service
- protectorate** *n.* (prə-'tek-t(ə)-ret) a protected country, usually by a superior power; a dependent country or region



AGE OF EXPLORATION AND COLONIZATION



Discovery, conquest, and colonization of far away lands led to an extraordinary expansion in trade.

While the Renaissance and Reformation were reshaping European civilization and culture, adventurous navigators made discoveries that changed economic life. This era is called the Age of Exploration (1415-1620). During this age, European mariners located a water route to India, circumnavigated the world for the first time, and discovered two new continents besides Europe.

The Age of Exploration signaled the dawn of Western expansion. Discovery, conquest, and colonization of far away lands led to an extraordinary expansion in trade. Discoveries of wealth, new reserves, and new economic outlook gave rise to Western capitalism.

For centuries, circumstances stimulated men to seek new routes rather than new lands: 1) toward the end of the 14th century, the vast empire of the Mongols was breaking up; thus, Western merchants could no longer be safe on the land routes; 2) Muslim traders controlled rich land and sea routes to Asia from the Indian Ocean to the Mediterranean Sea; 3) the increasing power of the Ottoman Turks, who were unfriendly to Christians, shut off the ancient sea routes from the East to the Mediterranean; and 4) new European nations, especially the Portuguese, were for overseas trade and adventure.

Portugal. Henry the Navigator, prince of Portugal, initiated the first great enterprise of the Age of Exploration. Prince Henry was not really a navigator but it was his vision and his inspiring guidance and patronage that enabled his mariners to discover new lands on the other side of the seas.

Portuguese mariners explored the coast of West Africa for almost seventy years before they found a passage to India. In 1488, a South Atlantic typhoon blew the ships of Bartholomeu Dias around the southern edge of the African continent. Days after, the tired crew saw land again. Dias called the tip of the continent "Cape of Storms" but the Portuguese king named it "Cape of Good Hope."

Dias' discovery of a sea route into the Indian Ocean encouraged Portugal to send Vasco De Gama on a diplomatic mission to the Indies, which proved to be the greatest navigational feat of the fifteenth century.

Later, with the help of an Arab from Mozambique, De Gama's fleet navigated the Indian Ocean to Calicut in the West Coast of India. With his accomplishment, Portugal was in a condition to rule the spice trade.

Trade in both Asian and European cities increase greatly. Europeans had to use gold and silver to pay for expensive Asian goods. Portuguese fleets carrying ivory, pepper, cinnamon, nutmeg and other luxury Indian goods sailed back the Indian and Atlantic Oceans in the long and perilous voyage back to Portugal.



Fill in the blanks.

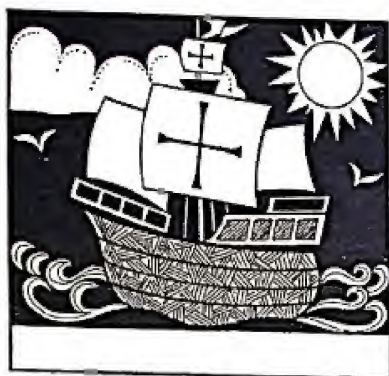
1. During Age of Exploration, European mariners located a water route to _____, the world for the first time, and discovered two _____.
2. During the Age of Exploration discoveries of wealth, new reserves, and new economic outlook gave rise to _____.
3. _____, prince of Portugal, initiated the first great enterprise of the Age of Exploration.
4. Dias called the tip of the continent " _____ " but the Portuguese king named it "Cape of Good Hope."
5. The discovery of a sea route into the Indian Ocean encouraged Portugal to send _____ on a diplomatic mission to the Indies, which proved to be the _____ navigational feat of the fifteenth century.
6. _____ is a policy by which a nation extends and maintains its control over foreign dependencies.
7. **THINK!** What were the circumstances that stimulated men to seek new routes rather than new lands?
 - a) _____
 - b) _____
 - c) _____
 - d) _____

Spain. In 1484, an Italian mariner named Christopher Columbus proposed to the King of Portugal to finance an expedition to India. But the king rejected the idea because Columbus had underestimated the circumference of the globe. Columbus then took his proposal to the rulers of Spain, Ferdinand and Isabella, who provided him with funds to equip a small fleet. With **caravels** Niña and Pinta and flagship Santa Maria, Columbus sailed from Spain on September 6, 1492. After more than a month of sailing they found a land and thought that it was Japan. He named it San Salvador. Friendly **Arawaks** inhabited the island. After a while, he visited Hispaniola (now the island where Dominican Republic and Haiti are found) where his flagship Santa Maria was wrecked. Without much choice, Columbus sailed back to Spain taking with him some Arawaks, which he called "Indians", as proof that he had reached Asia. As a result, the queen conferred to him the title "Admiral of the Ocean Sea."





Christopher Columbus



In 1493, Columbus returned to the Caribbean still believing that it was Asia. He and his two brothers brought shiploads of settlers and founded the first European colony in America. However, the Columbus brothers were found to be incompetent overseers and were brought back to Spain. Columbus, in his later voyage to the Caribbean suspected that the mainland nearby was a continent but he still believed that it was Asia.

Treaty of Tordesillas. The discoveries made by both Portugal and Spain created a heated rivalry between the two naval powers. After hearing about this dispute, Pope Alexander VI called for diplomats from Spain and Portugal to meet at Tordesillas to find a solution to the conflict. In this meeting, the Treaty of Tordesillas was signed. With the Treaty of Tordesillas (1494), Portugal and Spain settled rival colonial claims by dividing the non-Christian world between them. The demarcation line ran due north and south 100 leagues west of the Azores and Cape Verde Islands. All new lands lying east of this line were to belong to Portugal and all those to the west to Spain. Because of Portugal's dissatisfaction, the treaty was amended by Pope Leo II and moved the boundary line to 370 leagues which included Brazil to Portugal.

To pursue their claim, the Spanish sent out many expeditions to the West Indies. An Italian navigator, Amerigo Vespucci, made expeditions for both Spain and Portugal and recorded colorful accounts of his voyages. Eventually, North and South America were named after him. To further the Spanish exploration, Juan Ponce de Leon, who once traveled with Columbus, explored and founded a colony in Puerto Rico and discovered Florida. Another settler, Vasco Nuñez de Balboa, went to search for gold and built a settlement named Panama. In 1513 he crossed the **Isthmus** of Panama and was the first European to view the "Great South Sea" presently named the Pacific Ocean.

Fill in the blanks.

- _____ was an Italian mariner who was not supported by the king because he underestimated the circumference of the globe.
- Columbus took his proposal to the rulers of _____ who provided him with funds to equip a small fleet.
- _____ were small light ships once used by the Spanish and Portuguese in the 15th and 16th centuries.
- The _____ were members of an American Indian people who once inhabited the West Indies.
- Columbus sailed back to Spain taking with him some Arawaks, which he called "_____", thinking that he had reached India.
- The Queen of Spain conferred to Columbus the title "_____ of the _____."
- Columbus always suspected that the mainland near Hispaniola (San Salvador) was a continent of _____.
- In the _____, Portugal and Spain divided the non-Christian world into two wherein new lands lying east of the demarcation line were to belong to _____, and all those to the west to _____.
- North and South America were named after an Italian navigator, _____.
- An _____ is a narrow strip of land connecting two larger masses of lands.

Magellan circumnavigated the world. Ferdinand Magellan was a Portuguese navigator who persuaded Spain's ruler Charles I to provide funds for an expedition to the Pacific Ocean and its Islands. In September 20, 1519, with 5 ships and 265 men, Magellan sailed out on a historic journey.

Magellan sailed through familiar waters along the West Coast of Africa and then south to the equator. There, the fleet turned south-southwest and over the Atlantic to a place adjoining Recife in Brazil. Magellan explored the coast of South America for a passageway through the continent. In December he sojourned at Rio de Janeiro and traded with the Native Americans for supplies. Going south, he looked into Río de la Plata, which he thought was the passage because it was so wide. As the southern winter arrived in April, the ships hid from the storms in Port San Julián, now in Argentina. During the five-month stopover, Magellan suppressed a mutiny among his men and one ship was lost.

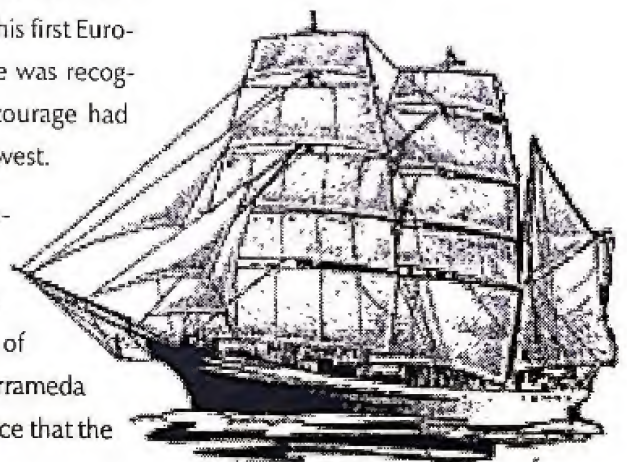
The voyage resumed in August. Magellan, now with only four sailed farther south, reaching a point where the nights were only three hours. With great skill they navigated the furious tides and the winding passages of the strait that was later named Strait of Magellan. Coming out into the "Great South Sea" Magellan found it so placid that he named it *Mar Pacífico*, the "peaceful sea". Despite the calm weather, the fleet suffered greatly in a different way. Magellan had miscalculated the ocean's size, and his course was too far north. The fresh food and water were consumed and his men suffered from scurvy. When supplies were all used up, they were reduced to eating the leather ropes, sawdust, and even rats. Many of his men died before the fleet finally got to an island - probably Guam - in the western Pacific. There, the natives robbed them and because of this, Magellan named the islands the *Islas de Ladrones* (Islands of Thieves) which were later renamed the Marianas Islands.

Leaving the Marianas, Magellan navigated southwest to the Philippines, where he converted two local rulers to Christianity. After converting Humabon, ruler of Cebu, he supported Humabon in a battle with a rival chieftain, Lapu-Lapu. In the heat of battle Magellan's men withdrew and he was killed on April 27, 1521. Consequently, Lapu-Lapu became a Philippine national hero for opposing this first European invasion. Despite Magellan's failure to complete the voyage, he was recognized as the first person to circumnavigate the world. His feat of courage had proven that the world is round and that one can reach east by sailing west.

After Magellan's death, Captain Juan Sebastián del Cano took command of the reduced fleet and brought it to its goal, the Moluccas, where he loaded a cargo of cloves. Cano made the long westward return voyage with one last ship, the *Victoria*. After a difficult voyage of almost three years, with a crew of 18, the *Victoria* arrived at Sanlúcar de Barrameda on September 6, 1522. The shipment of cloves sold for such a high price that the losses of the expedition were covered by its profit.

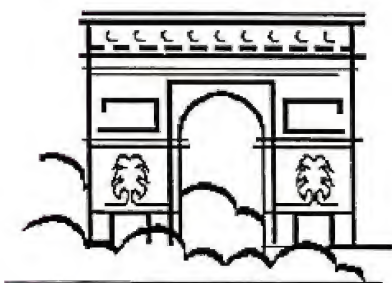


"Magellan's feat of courage had proven that the world is round and that one can reach east by sailing west."



Fill in the blanks.

1. _____ was a Portuguese navigator who was sent by Spain for an expedition to the Pacific and its islands.
2. The winding passage at the southern tip of South America that Magellan passed through was later named _____ of _____.
3. Coming out into the "Great South Sea," Magellan found it so placid that he named it _____ the "peaceful sea".
4. When the supply of water and food were consumed, Magellan's men were reduced to eating the leather ropes, sawdust and even _____.
5. Magellan died in the Philippines when they encountered a Filipino chieftain, _____, who opposed a foreign invasion.
6. Despite Magellan's failure to complete the voyage, he was recognized as the first person to _____ the world.



French in Indochina. *Indochina* is a name usually given to the peninsula between India and China. It is formerly a federation of states in Southeast Asia which comprised the French colony of Cochin China and the French protectorates of Tonkin, Annam, Laos, and Cambodia (Cochin China, Tonkin, and Annam were later united to form Vietnam). The capital was Hanoi. The federation formed the easternmost region of the Indochinese peninsula (which it shared with Myanmar, Thailand, and Malaya).

For the purpose of this study, French Indochina refers only to Cambodia, Laos, and Vietnam, which, between 1893 and 1954, were united politically under the name French Indochina.



French Indochina



Cambodia. In 1863, France rapidly enlarged its infiltration of Indochina and proclaimed a protectorate over Cambodia. French rule in Cambodia was practiced through counselors whose decisions were final on major subjects. The Cambodian kingship was retained, and a Khmer civil service was gradually trained. Emphasis was on building. Roads, ports, and other public works were built for internal security and the export of rubber and rice. The reparation of the Angkor Wat in the 1930s helped stir up the Khmer people's pride in their past. During World War II (1939-1945), when Japanese forces entered Indochina in 1940, they installed a puppet French administration. On the verge of defeat in 1945, the Japanese replaced their French collaborators with a nominally independent Khmer government under the young king, Norodom Sihanouk. France quickly reclaimed control after the war, but Sihanouk led the Cambodians to independence in 1953.

Laos. Antagonism between Siam (Thailand) and Vientiane led to the vanquishing of the latter in 1778. In 1827, when Vientiane tried to claim its independence, Siamese forces totally destroyed it.

In the second half of the 19th century, the French appeared. A French military crusade in 1893 occupied the important towns of the country and compelled Siam to acknowledge the **dependency** that France had built over Laotian territory east of the Mekong River. In 1904 France got whatever Laotian territory had remained under Siamese control. The French ruled Laos indirectly through the king of Louangphrabang and a hierarchy of royal officials.

After the withdrawal of the Japanese forces during World War II in 1945, a movement for independence known as the Lao Issarak (Free Laos) organized a nationalist government. The movement broke down when the French returned to the region in 1946. The French then signed an agreement with the king of Louangphrabang that made him king of a unified Laos within the French Union. A constitution providing for an elected legislature was promulgated on May 11, 1947. In 1949 Laos became an independent state within the French Union, and most of the self-exiled nationalist leaders returned to the country. However, a few dissidents under the leadership of Prince Souphanouvong allied themselves with the pro-Communist Viet Minh forces fighting the French in Vietnam. These Laotians who called themselves Pathet Lao, joined with the Viet Minh forces to attack Laos in April 1953 and quickly gained control of major areas. Later, the French agreed to give Laos full independence.



Angkor Wat in Cambodia

In 1949 Laos
became an
independent
state within
the French
Union

Fill in the blanks.

- 1: _____ was a former French colonial empire in Southeast Asia comprising much of the Indochinese Peninsula.
2. Indochina is a name usually given to the peninsula between _____ and _____.
3. French rule in _____ was practiced through counselors whose decisions were final on major subjects.
4. King _____ led the Cambodians to independence in 1953.
5. A _____ is a protected country, usually by a superior power; a dependent country or region.
6. A _____ is a territory under the rule of another country of which it is not an integral part.
7. The French ruled Laos indirectly through the king of _____ and a hierarchy of royal officials.
8. _____ (Free Laos) was a movement for independence in French Laos.

Vietnam. In the hope that the new emperor would provide France with trading and missionary privileges, a French missionary, Pierre Pigneau de Behaine, raised a **mercenary** force to help Nguyen Anh seize the throne. The Nguyen dynasty was suspicious of French influence and in the 1830s persecuted Roman Catholic missionaries and their Vietnamese converts. Religious groups in France called for a response from the government in Paris. Emperor Napoleon III approved the sending of a naval campaign to punish the Vietnamese and force the court to accept a French protectorate. After a series of assaults and defeats, the Vietnamese accepted a French protectorate over Vietnam in 1862.



“Negotiations between French and Viet Minh, which were held in France, failed to settle differences and war broke out in December 1946.”

The pressure of French colonial control had met with weak resistance. However, the national feeling of unity had not been crushed and soon anticolonial views began to rise. Poor economic situations created hostility to French rule. Colonialism brought little improvement in livelihood to the masses although French rule improved transportation and communications, and contributed to the growth of commerce and manufacturing. Peasants struggled under heavy taxes and high rents in the rural areas. Factory workers in factories, in coalmines, and on rubber plantations labored for low wages in dehumanizing conditions. By the early 1920s, nationalists began to shout for reform and independence. In 1930 the activist Ho Chi Minh organized an Indochinese Communist Party.

During World War II, Japan placed Vietnam under military occupation, limiting the local French administration to titular authority. Taking advantage of the situation, the Communists organized the Viet Minh and prepared to launch an uprising after the war. The Viet Minh (short for Viet Nam Doc Lap Dong Minh, or League for the Independence of Vietnam) stressed moderate reform and national independence rather than strictly Communist aims. After the Japanese surrendered to the Allies in August 1945, Viet Minh troops arose all over Vietnam and proclaimed an independent republic in Hanoi.

However, the French refused to grant independence and in October pushed the Viet Minh and other nationalist groups out of the south. Negotiations between French and Viet Minh, which were held in France, failed to settle differences and war broke out in December 1946.

The struggle lasted for eight years and the Viet Minh retreated to the hills and resorted to guerilla warfare. In 1953 and 1954 the French barricaded a base at Dien Bien. After months of heavy fighting, the Viet Minh sacked the stronghold. As a consequence, the French government agreed to negotiations to end the war in June 1954.

True or False.

- _____ 1. The French government wanted to depose the king of Vietnam to be replaced by somebody who favored them.
- _____ 2. Emperor Napoleon III sent a naval campaign to punish the Vietnamese and forced the court to accept a French protectorate.
- _____ 3. French rule improved transportation and communications, and contributed to the growth of commerce and manufacturing.
- _____ 4. During World War II, Japan placed Vietnam under military occupation, expanding the local French administration's authority.

Fill in the blanks.

1. A _____ is a person serving a foreign army for the monetary value of service.
2. _____ is a policy by which a nation extends and maintains its control over foreign dependencies.
3. A _____, Pierre Pigneau de Behaine, raised a mercenary force to help Nguyen Anh seize the throne.
4. The Communists organized the _____ and prepared to launch an uprising against French colonizers.

British India, China and Hongkong. After the loss of American colonies during the American War, British looked to the east in its search for spices and for markets for British manufactured goods. Free trade was the economic motive behind the Second British Empire which focused on Asia and Africa in the early 1800s to 1900s.

East India Company. East India Company was a company commissioned by Queen Elizabeth I for trade with Asia. It was a group of merchants involved in breaking the Dutch **monopoly** of the spice trade with the East Indies. However after Dutch massacred British traders, the company admitted defeat and focused its activities in India. Despite the large profits from Indian exports, it had to deal with serious problems between India and England. To protect its stability, the company exposed itself more and more in Indian political affairs. East India Company acquired vital political status.

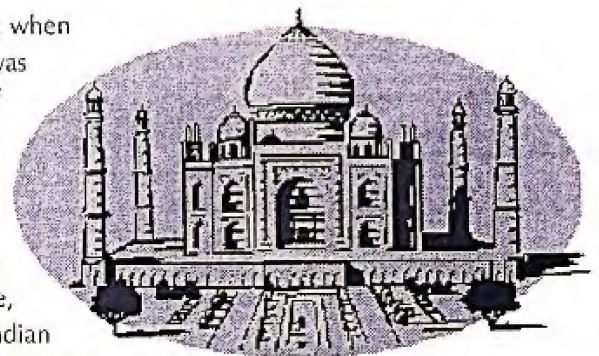
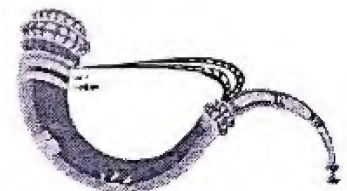
However, the people of India were not complacent to British control. Many assertive tribes induced troubles for the East India Company. Gradually, the British government, through Parliamentary legislation, reduced the authority of the East India Company and took over the controls of the government. The British government did not take complete control, however, until an insurrection, the Sepoy Rebellion, needed a radical move.

The Sepoy Rebellion started among native soldiers in the British army who believed that the British had no respect for their religious belief. They rebelled instead of violating their religion. The insurrection spread beyond the military to the civilians who feared that their traditions and political autonomy will one day be destroyed. Consequently, the government enacted the India Act of 1784, which took away all political authority from the East India Company and gave the full control to the British government.

England tried to respect the religious traditions of India. However, when the custom was so barbaric, the government stopped it. One example was the *suttee*, which is the burning of a widow, alive, with the dead body of her husband. The British ended such practices but preserved most Indian traditions; hence, India's culture became a mixture of the West and the East.

The history of India is colored with protests and rebellion to gain their independence from British dominion. In the height of their struggle, a Hindu social and religious reformer Mohandas K. Gandhi urged the Indian people to counter British suppression with passive resistance and led the people to attain their independence on August 15, 1947.

“East India
Company was
company
commissioned
by Queen
Elizabeth I for
trade with
Asia.”

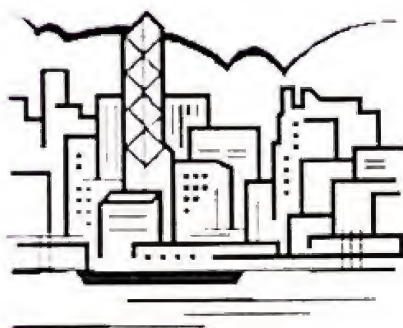


True or false.

- _____ 1. Free trade was the motive behind the Second British Empire focus on Asia and Africa.
- _____ 2. The British looked to the east in its search for spices and for markets for British goods.
- _____ 3. The people of India were complacent to British control.
- _____ 4. The Sepoy Rebellion was the reason why the British government took control of India.
- _____ 5. The history of India is colored with rebellions to gain their independence from British rule.

Fill the blanks.

1. _____ is the exclusive control or ownership, as of a commodity or service.
2. _____ was a group of merchants commissioned by Queen Elizabeth I for trade with Asia.
3. The _____ started among native soldiers in the British army who believed that the British had no respect for their religious belief.
4. One example of an Indian barbaric tradition was the _____, which is the burning of a widow, alive, with the dead body of her husband.
5. The British ended such practices but preserved most Indian traditions; hence, India's culture became a mixture of the _____ and the _____.
6. A Hindu reformer _____ urged the Indian people to counter British suppression with passive resistance.



"After Mao's death in 1976, Hong Kong's industrial and technological relationship with China intensified."

Hong Kong. The British control of Hong Kong began in 1842, when China was forced to cede Hong Kong Island to Great Britain after the First Opium War.

The British became interested in Hong Kong in the early 19th century because they wished to expand their trading opportunities along China's coast. The trade of opium, which was an illegal import into China, led to the Opium Wars and Britain's acquisition of Hong Kong. In 1839 when British merchants were imprisoned in Guangzhou, British foreign secretary, Lord Palmerston, sent naval forces and war followed. In 1841 after they won the battle, the British occupied Hong Kong Island.

Hong Kong grew slowly during the 19th century. The territory began to grow more rapidly in the 20th century as employment in Hong Kong's developing light industries attracted Chinese immigrants. The greatest growth and progress of Hong Kong happened after the Communist takeover of China in 1949, when the commercial and shipping industries in Guangzhou and Shanghai moved to Hong Kong. Furthermore, new business investments based on low-cost and productive labor led to the speedy growth of industrial employment.

During the Communist regime, trade and travel between Hong Kong and China continued to flourish. After Mao's death in 1976, Hong Kong's industrial and technological relationship with China intensified. In July 1, 1997, Britain's control of Hong Kong ceased but it is expected that Hong Kong will strive to retain its economic role and the trust of the world in its banking, trading, and shipping services.

Fill in the blank.

1. The British control of Hong Kong began in 1842, when China ceded Hong Kong Island to Great Britain after the _____.
2. During the _____ regime, trade and travel between Hong Kong and China continued to flourish.
3. On _____ Britain's control of Hong Kong ceased.
4. It is expected that Hong Kong will strive to retain its economic role and the trust of the world in its _____, and _____ services.

The Philippines and Japan as American colonies. The Philippines became a colony of USA after the countries of Puerto Rico, Guam, and the Philippines were ceded to the United States for \$20 million by Spain after the signing the Treaty of Paris in December 18, 1898. At the same time, the United States announced the establishment of U.S. military rule in the Philippines.

The Filipinos met the American occupation with resistance. Antagonism soon increased, signaling the onset of bloody conflict between the United States and Filipino rebels that would continue for more than two years. Thousands of Filipinos died during the war against the United States. Most of them were civilians who died of famine and disease brought about by the war than by actual combat. The war seriously reduced agricultural output and created severe food shortages. The Philippines was governed by the United States until after World War II (1939-1945). On July 4, 1946, the Philippines was granted complete independence from US occupation.

American occupation brought many changes to the Philippines. Because of their imperial activities, our natural resources were exploited. Large volumes of lumber were exported to the homeland. Many raw materials in their production came from the Philippines.

However, American occupation in the Philippines changed the kind of Christianity that the locals once practiced. It opened their eyes to the fact that the salvation of the soul is not by the good deeds done by following certain religious procedures but it is free by the grace of God through faith in Jesus Christ.

On August 11, 1945, Douglas MacArthur was designated Supreme Commander for the Allied Powers, occupying Japan following the Japanese offer to surrender. The objectives of the occupation policy were the democratization of the Japanese government and the rebuilding of a peacetime industrial economy adequate for the Japanese people. A program of land reform designed to give the tenant farmers a chance to buy the land they worked and an education program along democratic lines was established.

The restoration of Japan's economy was harder than the reparation of the government. The problem of scarcity of food had to be solved by imports from the United States and other Allied powers. Severe bombings during the war ruined industrial capacity. The rehabilitation of Japan was costing the United States more than \$1 million a day by the beginning of 1949.



Full Supremacy Granted

On April 28, 1952, full supremacy was returned to Japan but U.S. troops remained as security forces as provided for in the Japanese-American treaty of 1951. The Japanese government signed treaties of peace and renewed diplomatic relations with Taiwan, Burma, India, and Yugoslavia.

Fill in the blanks.

1. Puerto Rico, _____, and the _____ were ceded to the United States for \$20 million by Spain after the signing the Treaty of Paris.
2. Thousands of _____ died during the war against the United States.
3. The United States governed the Philippines until after _____.
4. American occupation in the Philippines _____ the kind of Christianity that the locals once practiced.
5. Douglas MacArthur was designated _____ for the Allied Powers occupying Japan following the Japanese offer to surrender.
6. On _____, the Philippines was granted complete independence from US occupation.
7. The rehabilitation of Japan was costing the United States more than _____ million a day by the beginning of 1949.
8. On _____ full supremacy was returned to Japan but U.S. troops remained as security force.

Score pages 24 - 33.	<input type="text"/>	Correct mistakes.	<input type="text"/>	Rescore.	<input type="text"/>
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CHECKUP

D11

My Score _____

Fill in the blanks.

(5 points each)

1. _____, prince of Portugal, initiated the first great enterprise of the Age of Exploration.
2. During the Age of Exploration discoveries of wealth, new reserves, and new economic outlook gave rise to _____.
3. In the _____, Portugal and Spain divided the non-Christian world into two wherein new lands lying east of the demarcation line were to belong to _____ and all those to the west to _____.
4. Magellan died in the Philippines when they encountered a Filipino chieftain, _____ who opposed a foreign invasion.
5. King, _____ led the Cambodians to independence in 1953.
6. The _____ was a group of merchants commissioned by Queen Elizabeth I for trade with Asia.
7. _____ started among native soldiers in the British army who believed that the British had no respect for their religious belief.
8. A Hindu reformer _____ urged the Indian people to counter British suppression with passive resistance.
9. In _____, Britain's control of Hong Kong ceased.
10. Puerto Rico, _____, and the _____ were ceded to the United States for \$20 million by Spain after the signing the Treaty of Paris.

Basahin sa iyong superbisor.

Ang Aking Layunin

Matukoy ang mga bahagi ng diksyunaryo; matutunan ang wastong gamit nito

Makapagbigay ng mga salitang nagpapakilala ng pagsalungat at pagsang-ayon

Makapagpahayag sa pamamagitan ng wastong paggamit ng mga salitang salungat, salitang kabaybay ngunit magkaibang bigkas, at salitang kabaybay ngunit iba ang bigkas

Matutunan ang pagpipigil sa sarili

Pagpipigil sa Sarili

Masalimuot na mundo, buhay na kay gulo,

Di ba't kadalasa'y sarili natin ang may dulot nito?

Subalit kung matutunan nating pasakop

Sa mabuting Banal na Espiritu, Mapagpahamak na katawan at dila,

Tiyak na mapipigil, titino nang husto.

Sauluhin ang Talata

"Kung ang sinoman ay nag-iisip na siya'y relihioso samantalang di pinipigil ang kaniyang dila, kundi dinadaya ang kaniyang puso, ang relihion ng taong ito ay walang kabuluhan."

Santiago 1:26

Lahat ng talata sa Biblia ay hango sa: Ang Biblia
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Pagpipigil sa Sarili... Paano Nga Ba Ginagawa Ito?

D5 p. 10

Sa palaruan nakita ni Paolo na palakad-lakad si Jabez at namumula ang mukha. "Jabez, bakit parang galit ka yata?" ang bati ni Paolo kay Jabez. "Palagay mo ba, dapat akong matuwa ha!" ang pagalit na sagot ni Jabez kay Paolo. Isang katahimikan.... "Nag-away ba na naman kayo ni Roni?" Itinulis ni Jabez ang kanyang nguso at sumagot sa kausap. "Eh, papaano si Roni, lagi na lamang kong kinakatiyawan".

Habang nag-uusap ang magkaibigan, patakbong dumating si Roni. "Jabez, taba-ching-ching! Ano habulan tayo? Mahina naman kasi ang tuhod mo eh." Ang tuwang-tuwang sabi ni Roni kay Jabez. Lalong namula ang mukha ni Jabez. "Ayan naman siya Paolo, diko na talaga matitiis ito, papatulan ko na 'yan' ang sumbong ni Jabez sa kaibigan na nakatingin sa nag-aasarang magkaklase. "Roni, tigilan mo na nga 'yan baka umiyak na si Jabez at mag-away naman kayo sige ka pagagalitan ka ng tatay mo," ang pigil ni Paolo kay Jabez. Patuloy parin si Roni sa pangangantiyaw sa asar na asar na Jabez.

"Ganito ang gawin mo, kausapin mo siya at sabihin na nasasaktan ka na sa mga sinasabi niya, tingnan mo maiintindihan nya yun, kasi ganon yung ginawa ko ng minsang kantiyawan niya ako ng sobra-sobra." Ang payo ni Paolo sa kaibigan. "O sige, kausapin ko siya" at patakbong umalis si Jabez para habulin at kausapin si Roni. Pero nang makita siya ni Roni na tumatakbong palapit sa kanya, inakala niyang talagang nagalit na si Jabez dahil sa kanyang labis na pagbibiro, kaya tumakbo siya nang tumakbo para hindi abutan ng kaibigan. Hindi napansin ni Roni ang isang malaki at malalim na butas sa palaruan kaya... "Aaaah, haaayyy! Tulong, nahulog ako!" ang sigaw niya.

Napatigil si Jabez, sumigaw rin si Paolo. "Jabez tulungan natin si Roni, nahulog siya sa hukay!"

Pinagtulungan nilang iahon si Roni sa butas. Pagkaahon. "Paolo, Jabez, patawarin n'yo ako sa mga pangungutya ko sa inyo, hindi ko na ito uulitin. Maraming salamat din ha, kahit mahilig akong mang-inis sa inyo tinutulungan nyo pa rin ako." Pinatawad na kita" ang sagot ni Paolo." Canoon din ako Roni," ang tugon naman ni Jabez. Maraming salamat sa kabutihan ninyo" ang masayang tugon ni Roni. "Halikayo, pumunta tayo sa clinic upang gamitin ang sugat mo! hila ni Paolo sa dalawa.

Sagutan ang mga sumusunod.

1. Ano ang dahilan at nagagalit si Jabez? _____
2. Nang mahulog sa hukay si Roni, ano ang ginawa nina Paolo at Jabez? _____
3. Ano ang naisip ni Roni nang mahulog ito sa hukay? _____
4. Ano naman ang nasa isip ni Jabez nang mga sandaling iyon? _____
5. Sa palagay mo ba, kalooban ng Panginoon na magkaroon ka ng pagpipigil sa iyong sarili sa panahong ikaw ay galit tulad ni Jabez? Bakit? _____
6. Ayon sa iyong talata, ano pa ang dapat pigilin ng isang Cristiano maliban sa galit at pagkainis? _____

Pagpipigil sa Sarili

Masaya at matiwasay na nakauwi ang buong mag-anak mula sa pagtitipon sa iglesia. Matapos ang masarap na salu-salo sa hapunan, oras naman upang ang buong mag-anak na Salvacion ay magtipon.

"Tay, totoo nga po iyong binanggit ni Pastor sa pulpito na kailangan tayong maging mapagbantay sa bawat sandali," ani Roni.

"Bakit mo nasabi iyon, anak?" usisa ng ina.

"Kasi po, Nay, muntik na po kaming mag-away ni Jabez noong isang araw."

"Bakit? Anong nangyari?" sagot ng ama.

"Kasalanan ko naman po kasi, Tay. Kung bakit naman kasi gustung-gusto kong tuyain si Jabez," pagpapatuloy ni Roni.

"Alam mo, Roni, dapat sigurong bawas-bawasan mo ang panonood ng telebisyon. Kasi kung anu-anong natututunan mo dyan, sayang pa ang kuryente natin," pabirong wika ng kanyang kuya.

"Ganoon ba, Kuya? Palagay ko nga. Sa mga nakalipas na araw naging mapusok ako at halos hindi rin ako nakapagpigil sa sarili ko," dugtong ni Roni.

"Walang mabuting kauuwian ang pagiging mapusok, Roni," sagot ni ate.

"Oo, Ate. Kaya nga po nagkasundo kami ni Jabez na mag-ayos at maging mabuting magkaibigan uli," sabi ni Roni.

"Higit sa lahat, dapat ninyong unawain na nalulugod ang Panginoon sa Kanyang mga anak na nagmamahalan at nagtutulungang tunay," ang pahabol ng ama sa kanyang buong pamilya.

Sagutin ang mga sumusunod.

1. Tungkol sa anong bagay sumasang-ayon si Roni sa sinabi ng kanyang pastor sa pulpito?

2. Anu-ano ang mga payo ng mga kaanak ni Roni sa kanya? Paano siya makakapanagumpay sa pagiging mapusok? _____

3. Ano ang nais ng Panginoon para sa Kanyang mga anak? _____

4. May pagbabago na ba sa pananaw ni Roni sa kanyang pag-uugali? _____

Iskora ang mga
pahina 16 - 18.

Iwasto ang mga mali.

Iskorang muli.